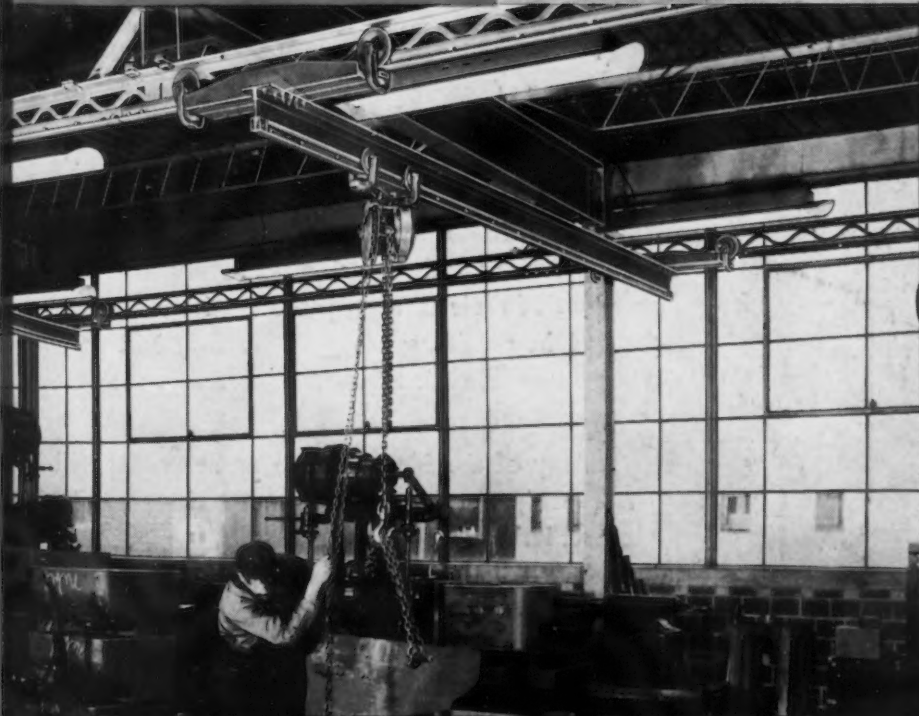
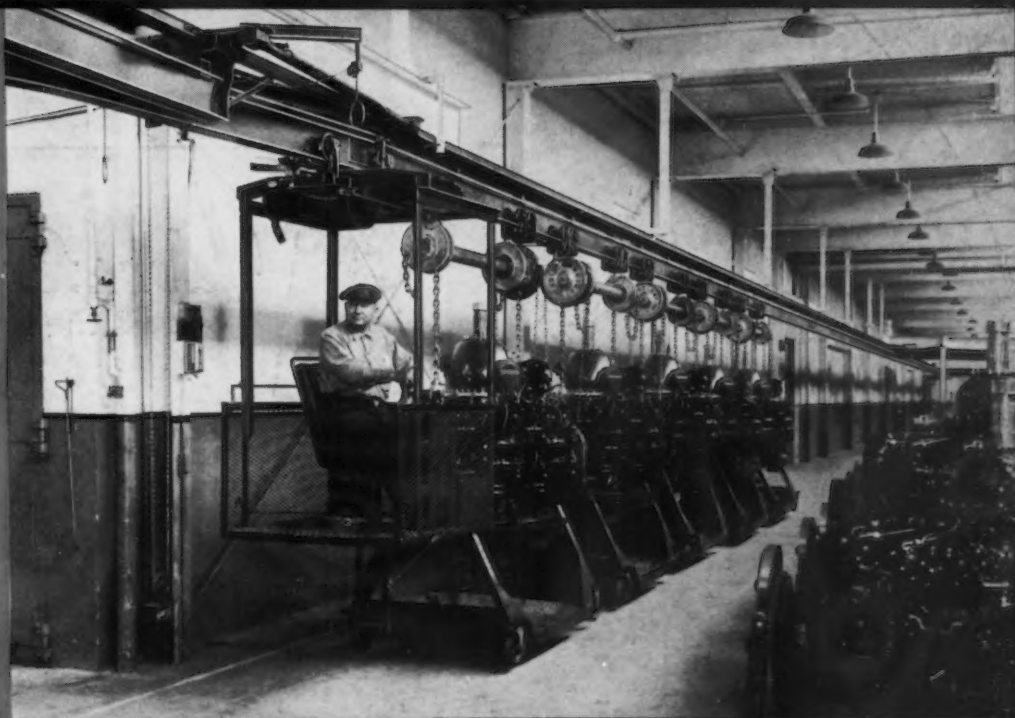


AUGUST 20, 1942

AUG 21 1942

# The IRON AGE



## SERVING AMERICA

*... at war or at peace*

In every industry, American MonoRail Equipment serves America by reducing fatigue and speeding production.

American MonoRail Engineers can show you overhead handling methods that will eliminate "too little" production—"too late" delivery.

# THE AMERICAN MONORAIL CO.

103 Athens Avenue

Cleveland, Ohio

Branches in 35 Cities to Serve You.

A Citation



for Men in War Industry

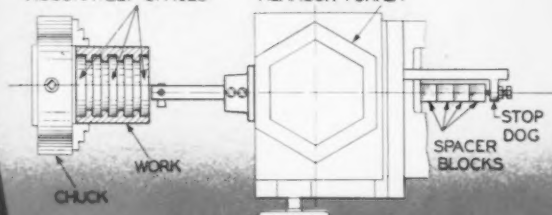


## Ideas for VICTORY

—from the Production Lines  
behind the Firing Lines

GROOVES MUST BE  
ACCURATELY SPACED

CROSS SLIDING  
HEXAGON TURRET



## He worked out a Neat Way to Hold Groove Spacing to Close Limits

Martin M. Klimko, (left, in photo above) is an assistant foreman in the machine shop of the Youngstown Sheet and Tube Co. One job called for cutting accurate grooves in a thrust bearing. The accompanying sketch shows how Klimko makes up a number of steel blocks shaped and ground equal to the pitch of the grooves to be cut. These are placed between the stop dog and master stop. After cutting the first groove, one block is removed and the carriage moved up to the second block, thus positioning the cutter to correct spacing for the second grooving cut. By putting this job on a turret lathe and employing this

method, time was cut from 16 hours to 3 hours per piece.

Martin Klimko offers this idea with the hope that others may find the principle involved of help on some of their turning jobs. We hope he is as pleased in receiving his gold Victory Pin as we were in sending it as an acknowledgment of his cooperation.

Many of the ideas sent to us are published in Blue Chips, a shop bulletin printed especially for turret lathe operators and sent free to their homes. Nearly 30,000 operators are on our list. We believe the interchange of practical shop ideas can be particularly valuable throughout the war effort. We not make sure your operators are getting Blue Chips? Write Warner & Swasey, Cleveland.

WARNER & SWASEY  
FOR VICTORY

YOU CAN TURN IT BETTER, FASTER, FOR  
LESS . . . WITH A WARNER & SWASEY



AUGUST 20, 1942

VOL. 150, NO. 8



J. H. VAN DEVENTER  
President and Editor

C. S. BAUR

Vice-President and General Manager

o o o

Managing Editor, T. W. LIPPERT  
News & Markets Editor, J. A. ROWAN  
Technical Editor, F. J. OLIVER

Associate Editors

D. R. JAMES

G. F. SULLIVAN D. C. MacDONALD  
Art Editor, F. J. WINTERS

Editorial Assistants

M. M. SCHIEN G. B. WILLIAMS  
J. I. BUTZNER S. H. BARMASEL  
R. E. BENEDETTO

Resident District Editors

L. W. MOFFETT T. C. CAMPBELL  
Washington Pittsburgh  
DONALD BROWNE W. A. PHAIR  
Washington Chicago  
B. W. CORRADO T. E. LLOYD  
Cleveland Detroit

CHARLES POST  
San Francisco

Editorial Correspondents

W. P. DEARING ROBERT G. McINTOSH  
Buffalo Cincinnati  
G. FRAZER R. RAYMOND KAY  
Boston Los Angeles  
HUGH SHARP JOHN C. McCUNE  
Milwaukee Birmingham  
F. SANDERSON ROY M. EDMONDS  
Toronto, Ontario St. Louis  
C. H. BACON  
Seattle

o o o

A. H. DIX, Manager Reader Service

o o o

Advertising Staff

Emerson Findley } 621 Union Bldg., Cleveland  
Robert F. Blair }  
B. L. Herman, Chilton Bldg., Philadelphia  
H. K. Hottenstein, 1012 Otis Bldg., Chicago  
R. Raymond Kay, 2420 Cheremoya Ave., Los  
Angeles, Cal.  
H. E. Leonard, 100 East 42nd St., New York  
Peirce Lewis, 7310 Woodward Ave., Detroit  
C. H. Ober, 100 East 42nd St., New York  
W. B. Robinson } 428 Park Bldg., Pittsburgh  
W. J. Fitzgerald }  
D. C. Warren, P. O. Box 81, Hartford, Conn.  
O. L. Johnson, Market Research Mgr.  
B. H. Hayes, Production Manager.  
R. E. Baur, Typography and Layout.

o o o

Member, Audit Bureau of Circulations  
Member, Associated Business Papers  
Indexed in the Industrial Arts Index. Pub-  
lished every Thursday. Subscription Price  
North America, South America and U. S.  
Possessions, \$8; Foreign, \$15 a year.  
Single copy, 35 cents.  
Cable Address "Ironage N. Y."

o o o

Owned and Published by  
CHILTON COMPANY  
(Incorporated)

Executive Editorial and  
Offices Advertising Offices

Chestnut and 56th Sts. 100 East 42nd St.  
Philadelphia, Pa. New York, N. Y.  
U.S.A. U.S.A.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, President

JOS. S. HILDRETH, Vice-President  
GEORGE H. GRIFFITHS, Vice-President  
EVERIT B. TERHUNE, Vice-President  
J. H. VAN DEVENTER, Vice-President  
C. S. BAUR, Vice-President

WILLIAM A. BARBER, Treasurer

JOHN BLAIR MOFFETT, Secretary

JULIAN CHASE, THOMAS L. KANE,

G. C. BUZBY, P. M. FAHRENDORF,

HARRY V. DUFFY CHARLES J. HEALE

This Week in . . .

# THE IRON AGE

## Editorial

Business after the War . . . . . 35

## Technical Articles

Hardenability of Steel . . . . . 37  
Duplicating "Flying Fortress" Templates . . . . . 40  
Silver for Bearings . . . . . 41  
Powdered Metal Particle Size Quickly Measured . . . . . 45  
Thread Milling Practice . . . . . 46  
Characteristics of A.C. and D.C. Arc Welders . . . . . 50  
Incentive for Production . . . . . 56  
Rapid Nickel Tests Speed Metal Segregation . . . . . 60  
New Equipment Machine Tools . . . . . 61

## Features

Assembly Line . . . . . 66  
Washington . . . . . 70  
West Coast . . . . . 74  
Fatigue Cracks . . . . . 78  
Dear Editor . . . . . 80

## News and Markets

This Industrial Week . . . . . 82  
News of Industry . . . . . 85  
Personals and Obituaries . . . . . 122  
Non-Ferrous Metals . . . . . 124  
Machine Tool Activity . . . . . 125  
Scrap Markets . . . . . 126  
Iron and Steel Scrap Prices . . . . . 128  
Comparison of Prices . . . . . 129  
Finished Steel Prices . . . . . 130  
Warehouse Prices . . . . . 134

Index to Advertisers . . . . . 189

Copyright, 1942, by Chilton Company (Inc.)



# MAHON STEEL ROOF DECK SAVES thousands of tons of structural STEEL


Using steel to save steel may seem contradictory—but many thousands of tons of structural steel are saved each month through the use of Mahon Steel Roof Deck.

Industrial buildings—all buildings, in fact, must be designed to carry whatever load the roof represents. The lighter the roof load, the greater the saving in the structural steel.

Mahon Steel Roof Deck averages approximately only 2½ pounds per square foot—that's why such important savings can be effected in the weight of the steel which supports a Mahon roof.

A permanent, firesafe roof is provided that embodies many structural and low-maintenance advantages available in no other type of roof construction. Let us show you these advantages—and comparative figures on how Mahon Steel Roof Deck conserves on steel and the investment economy which results. Write today for the NEW Mahon Steel Roof Deck catalog—or refer to Sweet's.

**THE R. C. MAHON COMPANY • DETROIT • CHICAGO**  
*Representatives in Principal Cities*



Mahon Steel Roof Deck consists of an assembly of interlocking ribbed steel plates securely welded together and to the supporting framework. Light—yet exceptionally strong and sturdy—and providing the greater protection from fire and weather which steel alone can give.

# MAHON

Manufacturers of Steel Roof Deck, Rolling Steel Doors, Shutters and Grilles, Galvalume Doors, Tin Clad Doors, Cast Iron Roof Sumps and Roof Sump Recesses.



# THE IRON AGE

• •  
AUGUST 20, 1942

• •  
ESTABLISHED 1855



## *Business after the War*

IT does not look as though this war will be over as soon as some people have said it would, so our main business for some time will be that of helping our side win it. Nevertheless a great many people are wondering what will happen to them after the tremendous production stimulus is removed by peace.

Management is wondering how it will be able to keep its greatly enlarged plant capacity busy and maintain its augmented working forces. And labor, as well as labor leaders, is doubtlessly thinking about that too.

Everyone knows that we have multiplied productive capacity greatly in nearly every manufacturing plant. In some lines, it has been as much as tenfold. In two years we have put into American industry as many new machine tools as we have normally put into it in a ten-year period. In two years we have put additional people to work in industry in number equalling the total number of workers employed in it in the boom year of 1929.

The great industrial problem in undertaking war is plant conversion; changing over equipment and workers from peace products to war material. We have found that this conversion process requires a good year at least for its accomplishment.

The great industrial problem after the war will be reconversion. Changing equipment and employment to peace time products once more instead of war products.

How long will this take? And how far downhill, in rate of manufacturing activity will we have to go before we begin to climb up again?

No one can predict the future, of course, but there is some comfort in questioning the past on these points. And the record of the Civil War and that of the first World War indicates that reconversion takes no longer than conversion, and in fact, less.

After the Civil War, there was a steady decline in rate of manufacturing activity for four months, striking bottom at a level about 23 per cent under the highest war activity peak of May, 1864. Four months later, or eight months after the Civil War's end, the climb back began and in 10 months thereafter, or 18 months after the war, manufacturing activity equalled that of the war peak.

After the first World War, there was a three months' continuous decline reaching bottom about 24 per cent below the highest war peak activity. The climb back began almost immediately and with slight interruptions continued until 10 months thereafter, or a total of 13 months after the Armistice, we were back to a level only about four per cent less than the previous war activity peak.

So now with that historical comfort, let's stop worrying about winning the peace and concentrate on winning the war.

*J. W. Van Dusen*



# Man-hours Lost Through Accidents

*Could Build*

**115,000  
FIGHTER PLANES**



**or, 300,000  
LIGHT TANKS**



**or, 99  
BATTLESHIPS**



The non-skid, heavy-duty tread of Inland  
4-Way Floor Plate assures safe footing  
for men and safe traction for wheels.

More than 480,000,000 days of work were lost in 1941 because of death and accidents to men and women of America.

This manpower could have been used to build 115,000 fighter planes, or 300,000 light tanks, or 99 battleships—enough fighting machines to win many battles and materially shorten the war.

Manpower in industry is the main source of war production—and the enemy of production is—ACCIDENT. Every lost-time injury to a worker is a setback to our war effort, and a delay to final victory. Accidents to war workers may also cause loss of men at the battle fronts, for only full war production can give our fighters the fire power and the protection they need.

Conservation of manpower is more important today than ever before, because this is a critical war year, and because 10,000,000 new workers, unversed in modern safety practices, are being added to factory payrolls. Keeping America's industrial manpower at full time production is a job for management—it is a job for the worker, for his home folks—it is a job for all America.

The iron and steel industry ranks near the top among all industries in safety of workers, and Inland's safety record is one of the best in the steel industry. But greater effort than ever is being made by our safety department and medical clinic to conserve every hour of every Inland man.

Doubling and redoubling our efforts to conserve manpower for maximum war production in 1942 is one of the best ways we can back up our fighting men.

**INLAND STEEL CO.**

38 S. Dearborn St., Chicago

Sales Offices: Milwaukee • Detroit • St. Paul • St. Louis • Kansas City





# Hardenability of Steel

By A. E. FOCKE

Research Metallurgist,  
Diamond Chain & Mfg. Co., Indianapolis

... In this, the first of three articles, the author records the concepts involved in measuring hardenability. The subsequent articles will outline the test methods used and their application to the war-born problem of replacement steels.

EVERYONE concerned with the heat treatment of steel has, at one time or another, made or supervised some type of hardenability test, but in many cases in the past it was economical to use steel with alloy content high enough that hardenability could be neglected. Now it is vital to use alloys only where they are absolutely necessary and in combinations which will provide the optimum results.

To a large extent the answer to this problem lies in an understanding of the principles and application of quantitative hardenability testing. Essentially this article is an extended review of material developed by others and presented by them more completely elsewhere. However, it contains those parts of all of this material which the author found most useful in determining how hardenability testing could be best applied to the solution of some of his production problems.

Two basic ideas are included in the term "hardenability." One is the maximum hardness to which a steel can be treated; and this aspect will be discussed first. The second phase involves the distance below the surface to which steel can be treated to a hardness over a fixed minimum.

It has been found that when steel is quenched from the austenitic state at the critical cooling rate which will produce martensite only—that is, at a rate fast enough to prevent completely any trans-

formation to fine pearlite (primary troostite), but slow enough to prevent the retention of untransformed austenite—the maximum hardness is a function of the carbon content only.

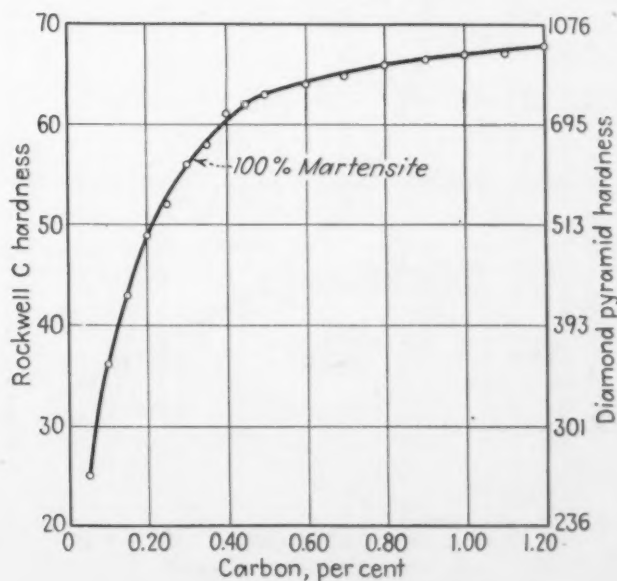
With low or medium alloy steels containing less than 5 per cent alloy, the amount of alloy does not significantly affect the maximum hardness. The solid line in Fig. 1 shows the relationship between this maximum hardness and the carbon content. The curve represents an average of data compiled from three sources.<sup>1,2,3</sup>

It is obvious that one measure

of hardenability would be obtained by comparing the surface hardness obtained on the test piece on which the carbon content was known with the maximum hardness associated with that carbon content as shown in Fig. 1.

On this basis, an inspection of Fig. 1 will show that above 0.40 carbon, the maximum hardness is reached or closely approached frequently by regular quenching practices on pieces of practical size, but as the carbon is lowered below 0.40, the difference between the hardness regularly obtained

FIG. 1—Correlation between maximum hardness and carbon content of steel.



and the maximum possible becomes greater and greater.

Using the definition that the critical cooling rate is that rate of cooling which will just prevent the transformation to fine pearlite (primary troostite), then this difference between the hardness obtained in practice and the maximum possible can be explained by the fact that the critical cooling rate above 0.40 carbon is within the range which can be produced commercially; but as the carbon content is reduced below this value, the critical cooling rate increases so rapidly that it can be approached only by special laboratory techniques on very small test pieces.

This is shown quantitatively in Fig. 2, taken from the work of Digges<sup>4</sup>, for pure iron-carbon alloys. The increase in critical cooling rate as the carbon is reduced below 0.40 is clearly shown in this chart. The idea of the effect of cooling rate is so important, not only to this part of hardenability which is concerned with the maximum hardness, but also in the depth of hardness phase of the problem, that it must be clearly understood.

Prior to 1930, it was common practice to show the relationship between cooling rate, transformation temperature, and structure by a diagram of the type shown in Fig. 3. With increasing rates of cooling, in plain carbon eutectoid steel, the austenite transforms at

progressively lower temperatures from the equilibrium transformation temperature of 1333 deg. F. ( $A_{1e}$ ) to a minimum of about 1100 deg. F. at  $Ar'$ . The transformation structures were called progressively pearlite, sorbite, and finally, troostite, usually designated as primary to distinguish such troostite from that found by the decomposition of martensite, and because of the association of this product with the  $Ar'$  transformation temperature. With only slightly faster cooling rates the temperature of transformation is drastically and suddenly reduced to about 300 deg. F. and the product of the transformation is now martensite. As stated above, this is the critical cooling rate.

With the advent of the procedures developed by Bain<sup>5</sup> and Davenport for measuring the time required to start transformation and the resulting products of transformation when the sample is suddenly quenched to and held at a temperature below the  $A_{1e}$  but above room temperature—that is, caused to transform isothermally at constant sub-critical temperatures commonly designated as austempering—it is quite usual to find diagrams of the type shown in Fig. 4 used to represent the critical cooling rate.

Such diagrams are only roughly quantitative because the position of the S curve (T curve) determined by isothermal transforma-

tions would not be duplicated exactly in a series of samples cooled continuously. But within this limitation, it is clear that the critical cooling rate is that which just misses the nose of the S curve.

In Fig. 5 are shown a series of representative cooling curves. The production of such curves depends upon special equipment such as the Rockwell Bristol Dilatometers which are not found in the ordinary metallurgical laboratory, and even these become inaccurate for very rapid cooling rates. Curve No. 1 may be considered to be that obtained by quench from 1500 deg. F. into still water, No. 2 into warm proprietary quenching oil, and No. 3 in cold mineral oil.

From Fig. 5 it is also clear that the cooling curves depart sufficiently from straight lines so that the value chosen for the cooling rate will vary considerably, depending upon the temperature range considered.

French<sup>6</sup> chose to represent the cooling rate by the slope of the cooling curves at 1333 deg. F., that is, at the  $A_{1e}$  temperature since that is the upper temperature at which the pearlite transformation could start.

Digges<sup>4</sup> calculated the cooling rate from the time required to cool from 1110 to 930 deg. F., following the work of Davenport and Bain, since this is the range of temperatures in which the nose of the S curve extends farthest to the left. (Fig. 4.)

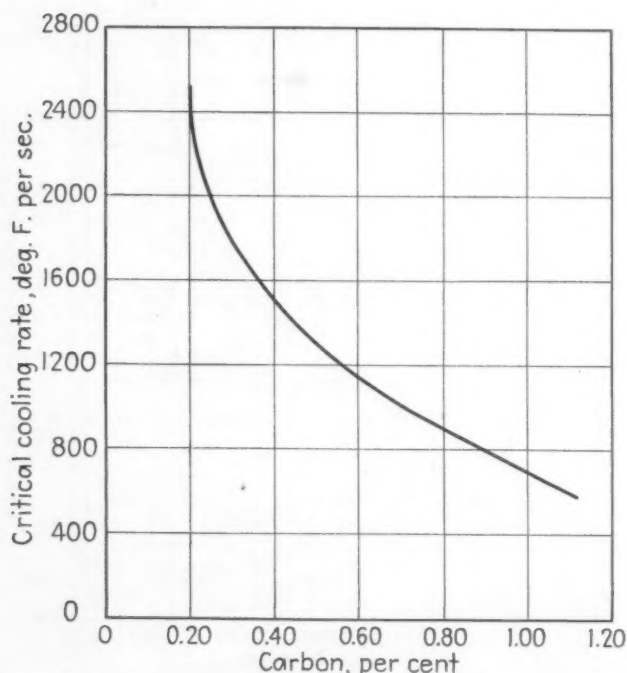


FIG. 2—Relationship between critical cooling rate and carbon content of pure iron carbon alloys. (After Digges.)

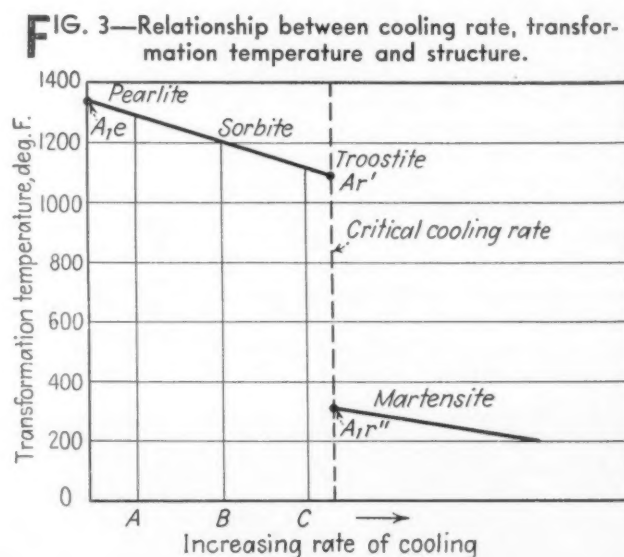


FIG. 3—Relationship between cooling rate, transformation temperature and structure.



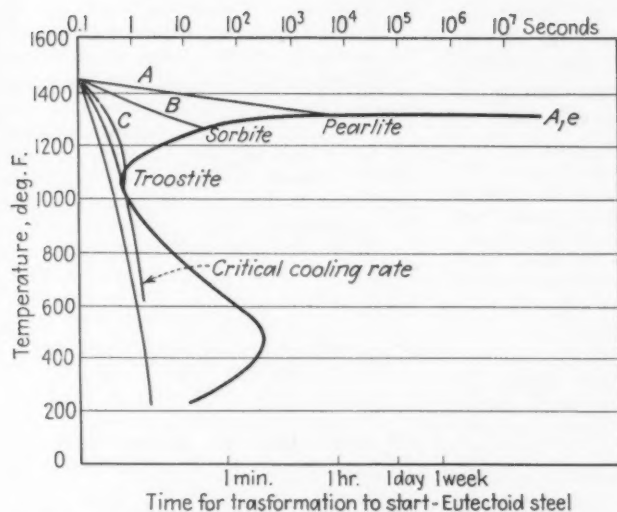


FIG. 4—Procedures developed by Bain and Davenport have led to the use of diagrams like this to represent the critical cooling rate.

By changing the quenching media and therefore the cooling rate within this range of temperatures, Digges was able to determine the rate which would produce only 1 to 3 per cent primary troostite, and it is these rates which are compiled in Fig. 2.

Jominy<sup>6</sup> chose to use the rate at 1300 deg. F. as the criterion, while Grossmann<sup>7</sup> and his associates found that their observed data would fit most accurately with the theoretical if they used the time to half temperature rather than the cooling rate as the determining factor.

In Table I are compiled the data from the three cooling curves of Fig. 5 as determined by each of these methods.

From the examples chosen it is clear that all four methods give about the same relative values for curves of 1 and 2, but that the cooling rate of a type 3 curve would vary by a ratio of 3 to 1, depending upon the method of measuring the rate.

This discrepancy is one of the weaknesses still remaining in the attempts to put hardenability on a true mathematical basis, although for practical purposes it may be ignored.

Another important point in this discussion of hardenability is that a cooling rate slower than the critical cooling rate but faster than that which will produce complete equilibrium will always result in the same hardness on parts from the same heat of steel treated in the same manner. Thus, in Figs.

3 or 4, a cooling rate indicated by line "A" might produce a relatively coarse lamellar pearlite of, for example, 20 Rockwell C; rate "B," a finer pearlite (sorbite) with Rockwell C hardness of 30; and "C," a very fine pearlite (primary troostite) of Rockwell C 45. Then in any part made from the same heat of steel within the limits of heat uniformity, all points which show Rockwell C 45 will have cooled at rate "C," all those at Rockwell C 30 at rate "B," and those at Rockwell C 20 at rate "A." This will be true providing the sample on which the cooling rate hardness data and the part examined had been given the same thermal treatment up to the point of cooling. It is then only necessary to determine the relationship between cooling rates and hardness on a simple shape which can be easily prepared and for which

the cooling rate can be measured or calculated, and with this information measure the effect of changes in material, pretreatment, hardening temperature, size, shape, or quench when one of these factors is varied and the others kept constant or controlled.

For example, assume that because of the war it is desirable to substitute SAE 1045 for a gear formerly made from SAE 3140 but on which the surface hardness must be kept above 45. Fig. 1 shows that a 0.45 carbon steel is capable of hardening well above this value. But experience may have shown that with the part in question 3140 will develop only 48 Rockwell C on the surface as quenched. The hardness-cooling rate distribution curves for 3140 and for 1045 would make it obvious that the cooling rate of the part which only produced Rock-

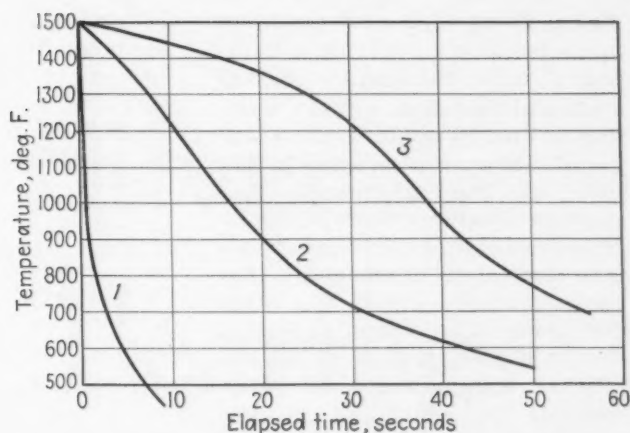


FIG. 5—Special equipment is required to produce these cooling curves of quenches from 1500 deg. F. Curve No. 1 is typical of a quench in still water, No. 2 in warm proprietary quenching oil, and No. 3 in cold mineral oil.

TABLE I  
Cooling Rates Determined from the Cooling Curves of Fig. 5 by Four Different Methods

Cooling Curve	Approximate Cooling Rate, Deg. F. Per Sec. at			Time in Seconds to T/2 (Grossmann)
	1333 Deg. F. (French)	1300 Deg. F. (Jominy)	1110-930 Deg. F. (Digges)	
1	1000	1000	1000	2
2	25	33	36	28
3	10	20	30	52

well C 48 on 3140 steel would be much too slow to provide a Rockwell C 45 on the surface of 1045 steel and therefore a much more drastic quench would be necessary if the 1045 were to be used. If this were all the information that could be developed there would be some justification in criticizing all this interest in hardenability because everyone knows the plain carbon steels are water hardening. But it is possible with slight additional manipulations of these concepts of equivalent cooling rates and hardnesses to predict whether even a normal water quench would have been sufficient for the part in question or whether special spray facilities would have to be provided.

Furthermore, in many cases the hardness throughout the cross-section as well as the surface hardness is important, which is the subject of the second part of the definition of hardenability.

*Editor's note: The author has divided his subject into three parts. Next week he will discuss the problem of the distance below the surface to which steel can be treated to hardness over a fixed minimum.*

#### Bibliography

- <sup>1</sup> "Hardenability of Carbon Steels," by J. L. Burns and G. C. Riegel, *Hardenability of Alloy Steels*, A.S.M., 1939, p. 283.
- <sup>2</sup> "Discussion of Hardenability of Carbon Steels," by A. S. Jameson, *Hardenability of Alloy Steels*, A.S.M., 1939, p. 293.
- <sup>3</sup> "Relation of Carbon Content to

- Maximum Hardness," by E. C. Bain, *Functions Alloying Elements in Steel*, A.S.M., 1939, p. 36 & 46.
- <sup>4</sup> "Effect of Carbon on Hardenability of High Purity Iron-Carbon Alloys," by T. G. Digges, *Transactions*, A.S.M., Vol. 26, 1938, p. 408.
  - <sup>5</sup> "Quenching Diagrams for Carbon Steels in Relation to Some Quenching Media for Heat Treatment," by H. S. French and O. Z. Klopsch, *Transactions*, A.S.S.T., Vol. 6, 1924, p. 251.
  - <sup>6</sup> "The Quenching of Steel," by H. S. French, A.S.S.T. Copyright, 1930.
  - <sup>7</sup> "Hardenability Test," by W. E. Jominy, *Hardenability of Alloy Steels*, A.S.M., 1939, p. 66.
  - <sup>8</sup> "Relationship of Hardenability to Quenching," by M. A. Grossmann, M. Asimow, and S. F. Urban, *Hardenability of Alloy Steels*, A.S.M., 1939, p. 124.

[The second of this series of three articles will appear next week.]

## Duplicating "Flying Fortress" Work Templates

**P**RODUCTION of Flying Fortresses under the Boeing, Vega, Douglas pooled-facilities program has been advanced six months through the use of an electrolytic transfer process by which the master pattern, or work template, can be reproduced in 5 min.

The only complete set of templates for the B-17 Flying Fortress in existence were at the Boeing Aircraft Co., Seattle. Duplicate sets were needed at both Vega and Douglas to enable those two companies to start work. The electro-

lytic transfer process, a Lockheed invention and patent, was utilized to eliminate the tedious, time-consuming hand reproduction of these duplicate working patterns.

Twenty-seven men from the Vega template group spent four months in Seattle reproducing 28,000 templates by hand from the master boards. Each of these 28,000 patterns was sent to Burbank, where reproductions were made by the new electrolytic process, requiring only 5 min. for each reproduction.

Complete sets of templates were turned out for Douglas, others were retained by Vega, and duplicate sets were sent Boeing to back up the master set from which the Vega men had made the drawings by hand. This saved each company about 50,000 man-hr., or a total of some 150,000 work hr. that would have to be completed before any manufacturing of parts, tooling or jig building could even have started.

The total cost of template layout copying by this new method, including labor and materials, has been found to be less than 10c. per sq. ft. or layout area, compared to a cost of \$1 per sq. ft. when hand reproduced.

Three steps in making work templates by the electrolytic process are: (1) Preparation of the original drawing by an engineer; (2) scribing drawing on a specially treated metal sheet to make the master layout, which is the point in the operation at which the Vega men began work in Seattle; and (3) the transfer of the scribed layout, with all detailed information noted on it, to an inexpensive metal copy sheet from which the work template is cut. The copying operation is routine and can be taught an unskilled employee in a comparatively short time.

**S**CRIBING the guide lines on the master template. These lines are cut through the insulating paint and clear lacquer which are sprayed on prior to marking.





# Silver for Bearings

By ADOLPH BREGMAN  
Consulting Engineer, New York

REMARKABLE expansion has taken place in the application of silver bearings for aircraft engines. Details of the production methods are not available for publication, as practically all of this work is being done under the war program. It is generally known, however, that the bearing, as finished, is a composite product consisting of a pure silver facing on a steel back. The silver facing is first sand blasted, then plated with a thin deposit of lead, and followed by a thin deposit of indium. Heat treatment of this bearing produces a bearing with the requisite oiliness which is sometimes missing from the pure silver bearing, together with the other desirable bearing properties of pure silver.

One of the large producers of silver bearings is the Cleveland Graphite Bronze Co., Cleveland. Some of their bearings are coated with lead and indium by their customers before actual use. It is reported that the silver-lead-indium bearing has a very high load-carrying capacity and a high resistance to fatigue; and also that it is more resistant to corrosion by oil than are some of the other types of bearings.

According to S.A.E. Aeronautical Material Specification AMS 4815 (Bearings: Silver, Steel Back) the bearing must consist of silver, electroplated on a steel back, the bearing metal containing not less than 99.75 per cent silver.

The procedure outlined includes

**... In concluding the discussion of the use of silver bearings for heavy duty service, the author describes the silver-lead-indium bearing that has found wide use in airplane motors.**

the following: (1) After proper cleaning, a flash coating or strike of copper and/or nickel is electroplated on the steel back. The silver is electroplated directly upon the copper and/or nickel strike. (2) After silver plating, the bearings are heated to 900 to 1000 deg. F. for 1 hr. to expose any defects in the silver. Hardened parts that will not stand 900 deg. F. are not heated to this temperature, but are treated by an acceptable method approved for each part.

The silver deposit must be uniform, dense, fine grained, and free from blisters or other defects appearing after the heat treatment and must be well bonded to the steel.

An interesting invention embodying the use of silver for an anti-friction bearing is described in U. S. Patent No. 2,266,319 taken out by Leonard S. Hobbs of West Hartford, Conn., and assigned to United Aircraft Corp., of that city. According to this patent, pure silver has been found satisfactory in a great many ways for the intermediate layer of a bearing. Silver is unsatisfactory for use as the layer in direct contact with the rotatable element, because of its

relatively poor anti-friction and wetting qualities and its tendency to expand rapidly in response to increases in temperature. But if the layer of silver can be prevented from developing local hot spots with high pressure areas, such a bearing has been found to be entirely satisfactory.

As the engine tends to hammer the bearing material between crankpin and the backing member; which tends, of course, to decrease the thickness of the layer and increase its area, the layer of silver must be sufficiently thin to resist this action and must have a bond with the backing that will retain the metal in place against spreading so that thickness of layer is not changed during operation of the engine. As the layer is controlled by necessary resiliency of bearing construction, ample resiliency is provided by a layer thin enough to remain intact under operation.

In order to accomplish the above objectives a bearing element, including a steel retainer and layer of bearing material including silver, is provided and machined so that internal dimensions of layer of bearing material are slightly too large for the crankpin upon which

bearing is to be fitted. The interior surface of silver layer may then be roughened by some suitable means such as sand blasting. A thin layer of highly flowable, malleable metal of good wetting properties, such as lead, is plated onto the roughened surface of layer of bearing metal. The layer of lead may then be smoothed down to proper thickness by a rolling operation. The thickness of the lead deposit may be accurately controlled to render rolling operation unnecessary.

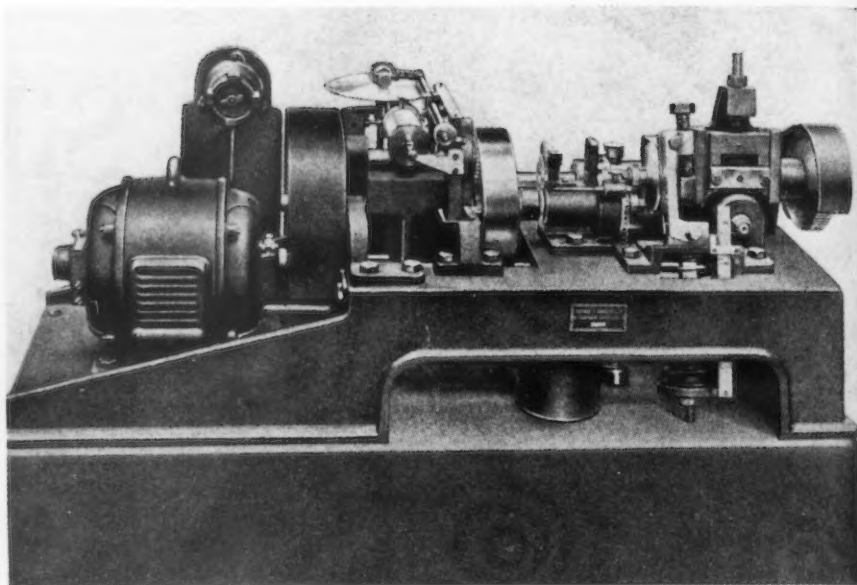
In order to produce a durable bearing, the thickness of the soft inner layer must be controlled within quite narrow limits in order that there shall be sufficient metal in the bearing to perform the function described above and also that the layer shall be thin enough so that the bond between the inner layer and the surface of the intermediate layer will prevent the metal of the inner layer from spreading or peeling.

The invention claims, therefore, a layer of bearing metal containing at least 50 per cent silver, bonded onto the inner surface of each backing member, and a coating on the exposed surface of said silver containing layer. The lead content of coating does not exceed 10 per cent of silver content.

In Patent No. 2,266,320, the inventor describes an improvement upon the type of bearing disclosed in the described patent. An object is to provide a bearing surface of a mixture or alloy of metals, having desirable surface characteristics.

A bearing comprising an intermediate layer of pure silver, from 0.02 to 0.03 in. thick, deposited onto and bonded to the inner surface of a conventional steel outer or backing member, and an inner layer of lead of a thickness of 0.001 to 0.0015 in., deposited on and bonded to the inner surface of silver layer, was found to provide an entirely satisfactory construction for bearings of about 3 in. in diameter under some operating conditions.

After the steel backing member has been finished and thoroughly cleaned, the silver layer is cast, molded, or otherwise secured (electroplated) onto the inner surface of backing member. The inner surface of silver may, if desired, be roughened by a suitable operation such as sand-blasting to provide irregularities of extremely small magnitude. The roughened surface of silver layer is then cleaned and degreased. After degreasing, a



**T**HIS Amsler abrasion testing machine was used in the tests for abrasion resistance of the silver plated bearings described.

protective fixture is assembled upon the shell or backing member in a manner to cover all of surface of shell and expose only bearing surface of intermediate layer of the bearing material. Before or after assembly of the protective fixture, the bearing surface may be further cleaned and processed by washing it with an alkali solution, washing in cold water, and subjecting to a dipping process in a cyanide solution.

Lead is then plated, preferably by electroplating, onto the roughened silver surface to constitute a thin layer. During the lead plating process, the current density is carefully regulated to maintain the current density substantially constant and uniform under all conditions. The plating time is varied in order to obtain the desired amount of plating deposit in this operation.

When sufficient lead has been deposited, the bearing assembly is removed from the lead plating bath, thoroughly rinsed with cold water, and the assembly is transferred to an indium plating bath for indium plating of the lead layer.

It is to be noted that in the case of a cylindrical solid plain bearing, this plating process may be conveniently and economically carried out by providing a different fixture which carries the anode and protects the end of the cylindrical bearing structure, and then filling the interior of the bearing with the plating solution and applying the current between the anode and lead layer through the backing shell or bearing retaining member, such as

the master rod or connecting rod. This method avoids the necessity of maintaining a large bath of the indium plating solution, the necessary tanks, and other expensive equipment.

The plating time in the indium bath should be controlled to provide a deposit of approximately 0.5 to 5.0 per cent by weight of the lead layer. After the indium plating operation is completed, the protective fixture should be removed from the bearing and the bearing rinsed, first in cold water, then hot water, and then thoroughly dried.

The bearing is then heated to a temperature somewhat above the melting point of indium and below the melting point of lead, a temperature of around 340 deg. F. having been found satisfactory. This temperature is maintained until substantially all visual evidence of indium plating has disappeared. Around 340 deg. F., two hr. is sufficient to cause the indium to impregnate the lead to produce a corrosion and erosion resisting alloy or solid solution mixture which still retains the excellent oil wetting and anti-friction qualities of a pure lead surface. It may be accomplished by baking the bearing in an oil bath of the specified temperature, although other heating or baking processes may be used. After removal, the bearing is ready for service.

The heating or baking step may be dispensed with in some cases and the bearings put into service with the indium coating as the



bearing surface. In this case the indium coating would serve to fortify the lead against erosion and corrosion. The temperatures attained during operation, if sufficiently high, however, might serve the same purpose as the baking and alloy the metals. Although indium may diffuse throughout the lead layer, the diffusion may not be uniform and there may be a greater concentration of the fortifying metal, that is, indium, adjacent the bearing surface than adjacent the silver layer.

A finishing step involving smoothing or polishing the bearing surface may be employed if desired, but it has been found that such a step is not necessary, if the described process is carefully controlled as indicated.

While indium has been mentioned as a desirable fortifying or impregnating medium for the metal of the soft inner layer, it is altogether possible to use some other metal having similar properties of forming a relatively erosion and corrosion resisting alloy.

The bearing metal on the backing member contains at least 50 per cent silver; lead not in excess of 10 per cent of said silver content, and indium not in excess of 10 per cent of said lead content, arranged in layers, one of which consists of the lead and indium content and another of which contains essentially all of the silver content. The silver layer is disposed between the

lead-indium layer and the backing member.

### Silver-Lead Bearings

As shown in Table I, the silver-lead alloys were found to have the best bearing properties overall except for ease of bonding. The alloy which gave the best results contained 3 to 5 per cent lead and the balance silver. Up to 1½ per cent lead exerts a slight hardening and strengthening effect. From 1½ to 5 per cent, little effect is noticeable, indicating that lead is soluble in solid silver up to 1½ to 2 per cent. A most important consideration is the harmful effect upon seizure resistance of impurities in the silver or silver-lead bearings.

The important disadvantage of the silver-lead alloy is the difficulty of bonding it to the steel back. The structure of this alloy is a simple eutectic diagram with limited solid solubility.<sup>3</sup> The eutectic point is at

<sup>3</sup> Hansen, "Der Aufbau der Zweistofflegierungen," Julius Springer, Berlin, p. 46 (1936).

"Tests on the Cadmium-Silver-Copper Bearing Alloy." *Machinist*, pp. 768E-769E, Jan. 18, 1936.

"Many Developments in Metals and Alloys." *Product Engineering*, 7, pp. 424 to 429 (1936).

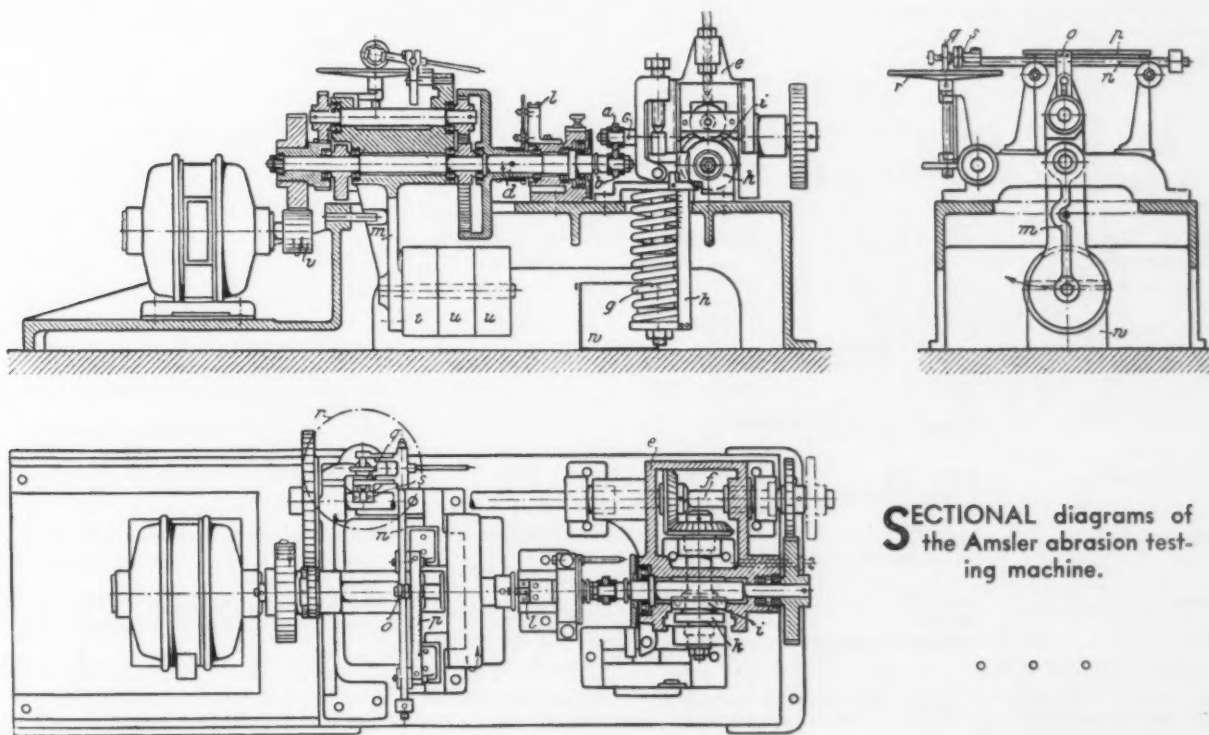
2.5 per cent lead with a melting point of 579 deg. F. The alloy is made up of two phases: (1) a silver-rich solid solution, and (2) almost pure lead. If the lead content is high, it segregates upon freezing

at the grain boundaries causing weakness and intergranular cracking, especially at higher temperatures. It seems that the maximum lead content which can be used without such intergranular cracking is between 3.68 and 4.68 per cent. If the alloy is heated to a temperature above 579 deg. F., the melting point of the eutectic, lead penetrates the silver along the grain boundaries as far as the steel back, and along the alloy to steel interface, weakening the silver-to-steel bond.

This intergranular weakness caused by the segregation of lead has been found characteristic of the lead-silver alloys mixed by melting. If, however, such an alloy can be applied to the steel back by other than thermal methods there should be no thermal segregation, and consequently a firmer bond or adherence. Such a method is available in electrodeposition or "cold casting."

Photomicrographs of electrodeposited low lead-silver alloys show no lead segregation even after annealing, which causes recrystallization, providing the annealing temperature is maintained at less than the melting point of the eutectic, 579 deg. F. No lead segregation is visible at grain boundaries or at the interface between the electrodeposited alloy and the steel back.

In general, the advantages of electrodeposition are as follows: (1) It is a cold process that leaves



**SECTIONAL** diagrams of the Amsler abrasion testing machine.



unaffected the hardness of the steel backing, even under the necessary annealing which is carried on at comparatively low temperature. (2) Scrap loss is at a minimum, unlike the casting process. (3) The deposit can be applied with equal facility on any part of the bearing, inside or outside of the backing. (4) The deposit has a uniform, fine - grained structure which, upon annealing, gives softer plates with higher seizure resistance, maintaining the uniform small grain size.

A natural question in the mind of the prospective manufacturer of such bearings is the ease and practicability of electrodepositing silver-lead alloys containing 3 to 4 per cent lead. The answer is that a practical method has been developed for this purpose<sup>9</sup> which under properly controlled operation, will give consistent, reproducible results.

<sup>9</sup> C. Faust and B. Thomas, "Electrodeposition of Silver Lead Alloys for Bearings," *Transactions of Electrochemical Society*, Vol. 75, pp. 217-18 (1939).  
F. C. Mathers and A. D. Johnson, "Electrodeposition of Silver Alloys from Aqueous Solutions," *Transactions of Electrochemical Society*, Vol. 74, p. 229 (1938).

The following bath is recommended:

	Gm. per Liter	Oz. per Gal.
Bath Composition*		
Potassium cyanide	22	3
Silver cyanide	30	4
Potassium tartrate	47	6.3
Potassium hydroxide	0.5	0.067
Basic lead acetate ( $Pb(C_2H_3O_2)_2 \cdot 2Pb(OH)_2$ )	4	0.53

\*Potassium salts are preferable to sodium salts.

To make up this solution, the potassium cyanide is dissolved in water, and the silver cyanide added. Then a separate solution of potassium tartrate and potassium hydroxide, to which is added the basic lead acetate, is made up. After both solutions are clear, they are mixed to form the final plating bath.

The plating may be done at room temperature, at 5 to 15 amp. per sq. ft. The anodes are 96.2 per cent silver and 3.8 per cent lead. The deposit obtained from this solution is uniform in composition (3.3 to 3.5 per cent lead) on a test bearing, from the flange to the face of the bearing. The bath should be agitated, especially at high current density. Anode and cathode efficiencies are nearly 100 per cent, with the anode efficiency slightly higher than the cathode.

The following factors affect the characteristics of the deposit, namely, the hardness, ductility, uniformity of plate composition, and thickness of the deposit, and most favorable anode corrosion: Current density, temperature, uniformity of agitation, lead-silver ratio, pH of bath, concentration of cyanide, tartrate, and carbonate, and metallic impurities in the anodes and the bath.

The bath is not very critical, fairly wide variations being permissible in current density, temperature, and agitation. This fact is of considerable importance in commercial operations, making it possible to plate a variety of shapes with reasonable uniformity. The

bath can be controlled by standard methods of analysis and metal is fed almost entirely from the anode.

The type of agitation must be determined empirically for each installation, depending upon the size and shape of the tank, the methods of racking, and the shape of the work. Excessive hardness of the deposit may be caused by too rapid stirring, and also by too high a concentration of hydroxide and free cyanide. Excessive current density increases the percentage of lead in the deposit. Higher temperatures lower the lead percentage, decrease the hardness, and increase the ductility of the deposit. Under proper operation and at the proper anode current density, the anodes are crystalline or very bright and smooth in appearance. Filming or sludging of the anode may be caused by too high current density or too slow agitation. Sludge is one of the outstanding causes of rough plates. Irregular anode corrosion may be caused by too low anode current density; spongy or non-adherent plate may be caused by too high cathode current density or too little agitation. A deposit of about 0.001 in. can be produced at 5 amp. per sq. ft. in one hr.

Tests on commercial silver-lead master rod bearings were made with an electroplated alloy of 3.5 per cent lead and 96.5 per cent silver. These bearings were annealed for five hr. at 500 deg. F., then for four days at 350 deg. F., then bored to size and tested in a Pratt & Whitney bearing testing ma-

TABLE III  
Seizure Resistance of Various Bearings as Determined in the Pratt & Whitney Engine Type of Bearing Tester

Bearing Material Designation	Composition, Per Cent	Speed to Obtain Seizure, R.P.M.	Bearing Pressure at Seizure, Lb. Per Sq. In.	Remarks
Silver bearing	Silver, 99.5 Copper, balance	2650	3410	
224 Bronze	Lead, 25 Tin, 3 Copper, balance	3000 to 3200	4380 to 4980	This type of bronze resists fatigue cracking in aircraft service.
Plated bearing, C-3	Lead, 3.62 Silver, balance	3400	5620	Electroplate 0.006 in. thick on silver bearing.
Plated bearing, C-4	Lead, 3.41 Silver, balance	3700	6650	Electroplate 0.0025 in. thick on silver bearing.
121 Bronze	Lead, 28 Silver, 1 Copper, balance	over 3950	over 7590	This material is not sufficiently fatigue-resistant for continuous service at this load.

Note: These tests were made against a finely ground shaft of carburized SAE 2512 steel, hardened to 57 Rockwell C. Because the shaft was ground and not polished, a pure silver bearing did not have an extremely high seizure resistance.

chine. Table III shows the seizure resistance of various bearings under this test.

The results indicated that the silver-lead had higher seizure resistance than pure silver, possibly because the shaft was ground and not polished, but less seizure resistance than the 121 copper-lead bearing. The failures that occurred in the silver plated bearings were the result of bond failure, not friction.

The most important problem in connection with the deposition of the low lead-silver alloy is the bonding of such an alloy to steel bearing backs. The potassium cyanide-tartrate-hydroxide bath instantly deposits silver on copper and steel by chemical displacement. There are indications that an immersion plate forms, either before or even during the first stages of electrodeposition of the alloy, even if the cur-

rent is switched on before the work is placed into the bath. The immersion plate, being poorly adherent, forms a poor bond between the subsequent electroplate and the steel backing. However, explorative tests indicate that a good bond can be obtained by using successive strike baths of copper cyanide and silver cyanide.

The application of a soft, ductile, low lead-silver alloy plate will make the bonding problem less severe, as hard, brittle, alloy plates require stronger bonding than the soft ductile plates.

#### Silver Bearings Economics

The only important objection to silver bearings is the relatively high cost for metal. For example, the silver in an aircraft bearing 2 $\frac{5}{8}$  in. in diameter, 3 $\frac{1}{4}$  in. long and 0.020 in. thick would be worth about \$1.50; in an automotive

bearing, 2.0 in. in diameter,  $\frac{1}{2}$  in. long and 0.01 in. thick, the cost would be about 10c. In the automotive engine, even this small cost must be considered, but aircraft engines are at the other end of the scale. Price is altogether secondary; quality being the primary objective. In lesser degree, but still to a considerable extent, quality is the leading prerequisite in bearings for diesel engines, tractors, trucks, and buses, where the cost can be balanced against improved operation and longer life.

#### Acknowledgment

Acknowledgment is hereby made of the valuable assistance in the preparation of this article rendered by the Silver Producers' Research Project, now operating under the management of Handy and Harman, N. Y.

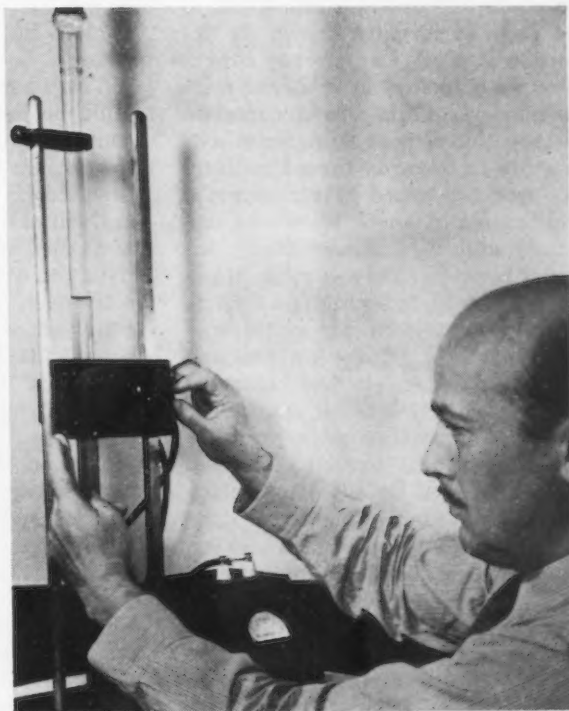
## Powdered Metal Particle Size Quickly Measured

USING only a glass tube, a photocell, a light source, and a milliammeter, P. R. Kalischer, Westinghouse research metallurgist, can determine grain sizes of metallic powders as small as 1/25,000 in. in about 1/30 the time usually required for such an analysis. Since the quality of a metal part produced by powder molding is dependent on the uniformity of the metal grains, this determination of particle-size distribution is especially important.

The photocell and the light source are mounted on opposite sides of the glass tube, and the output of the photocell is read by the milliammeter. To analyze a powder specimen, one gram of it is mixed in the tube with 100 cc. of acetone, to which a small amount of a wetting agent (isopropyl xanthate is one of the best) is added. The tube then is clamped between the photocell and light source. As the particles settle, the liquid clears and transmits more light to the cell.

From timed readings of cell current, a time-opacity curve is plotted for that specimen. By comparing this curve with similar curves for

BY plotting a time-opacity curve, determined by timed reading of the cell current, the size of the metal particles used in powdered metal molding can be quickly measured.



standard powders of known particle size, Kalischer can determine both average particle size and relative quantities of particles of different sizes in the test specimen.

The usual method of measuring particle size is to float the powder in glycerine and measure the settling time. Such a test requires about 8 hr., and does not give ac-

curate information about relative quantities of grains of different sizes. The simplified Kalischer method takes only 15 min.

Use of a wetting agent is important, because it helps the acetone to surround each metal grain completely. Without it, the settling rate might be affected by tiny air bubbles surrounding the grains.



# Thread Milling Practice

By ALBIN H. HENRIKSON

Field Engineer, Plan-O-Mill Corp.,  
Royal Oak, Mich.

**... War production requirements have given tremendous impetus to thread milling. The author gives what is perhaps the first complete analysis of planetary thread milling with multiple thread cutters and presents in tabular form detailed operating data on aircraft and ordnance parts taken from 30 defense contracting plants.**

CONSIDERABLE impetus has been given to thread milling as a result of the war effort. Within the last year or two, the number of manufacturers of thread milling machinery has been more than doubled and the number of machines produced has gone up ten times or more. My own company, which is one of the newcomers to the field (originally known as the Gordon R. Co.), has already over a hundred planetary type thread millers at work and is able to correlate the practice of over 30 defense contractors as regards thread milling. The work reviewed herein covers a wide range of parts, sizes and materials and both internal and external threads. Thread pitch diameters range up to as high as 6.42 in. and as low as  $\frac{3}{8}$  in. for an internal thread and  $\frac{1}{2}$  in. for an external thread. The commonest external thread milling job is for spark plug shells for aircraft engines, propeller blades and gun barrels. Thread milling is used on this application because of the toughness of the material and the tolerances called for. However, before going into details on these various applications, it will be well to distinguish the various processes of milling threads and the cutters employed.

The simplest form of thread milling is done with a single annular cutter which is tilted an amount equal to the helix angle in relation to the axis of the work. Either the cutter or the work is traversed axially with respect to the other and both cutter and work revolve.

Thread milling with a multiple thread tool is quite different from milling with a single annular cutter and also from hobbing. A hob is essentially a gashed worm with re-

lieved teeth and therefore it has a lead angle. A multiple thread milling cutter in cross-sectional view resembles a hob, but is actually made up of a series of annular cutters without lead. For an Acme thread form the cutting faces would closely resemble in cross-section the basic rack shape of a hob for cutting a gear with  $14\frac{1}{2}$ -deg. pressure angle. But there the resemblance ceases.

Thread milling, as done with the multiple thread cutter, can best be compared with the chasing of a thread in a lathe with a single point form tool. If we can imagine several threading tools placed together and the work rotating while the tools fed along the work at a given pitch lead, then in one revolution of the work a thread would be chased equal in length to the length of our composite tool. On the other hand, to chase threads on a lathe requires several cuts before the thread is finally cut to depth. If we can then imagine several rows of these tool bits placed annularly about an axis and being rotated rapidly and fed axially equal to the lead, we can readily see that less cuts to depth would be required because many teeth do the work of one.

Actually in planetary thread milling practice, the multiple thread cutter of zero lead is first fed into depth and then carried around the work piece by a planetary motion. The work is not rotated. Since the planetary action begins before the cutter reaches its full depth, the approach to the work is on an arc rather than straight in. The cutter has a sufficient number of threads (usually one or two more than the work) so that the work is threaded in slightly over one revolution of

the planetary motion. During this planetary motion the cutter spindle is advanced axially a distance equal to the thread pitch for each complete revolution. The work is clamped firmly in a fixture especially designed to accommodate it concentric with the spindle axis.

There are several conditions that have to be considered to do proper work and get the utmost of efficiency and finish:

(1) The pitch of the teeth of the multiple cutter must be exact. Any error in groove spacing will produce a lap mark after the feed has traversed one revolution of the planetary motion.

(2) The backoff of the cutter must be sufficient to clear the helix of the thread of the part being machined. This should not be less than 3 deg. and for the greater part not over 5 deg. Otherwise interference will take place. Cutters may be either form relieved in the green state or ground on the teeth flanks in the hardened condition. In either case, the cutters are sharpened by grinding the faces of the teeth either with or without rake.

While helical backoff on the flanks of the teeth is to be preferred, most side and top relief is straight. But whether the relief is straight or helical, it should be noted that corresponding points on the apex of all V-grooves or other thread forms, such as Acme, are in identical planes perpendicular to the center line of the tool. In other words, the teeth have no pitch relationship. The helical backoff should be greater than the helix angle of the thread being cut.

If the relief is straight and the resulting clearance on one side should approach zero or the negative in relation to the thread helix, a rough thread and chatter will result. Such a condition will be noticed on a right hand thread when the spindle and the planetary feed quill are both running in a counter-clockwise direction. Climb cutting, or the reversing of either the spindle or the feed quill, often corrects this trouble and directs the



feed on the side of the thread groove that has the greatest helical clearance. On precision work, ground grooves should be used instead of the more conventional machine relieving. Ordinarily, the cutters are ground only on the face like an ordinary form milling cutter.

(3) On heavier threads and particularly where the job is wide, a spirally gashed cutter should be used to eliminate having the total width of the cutter in a straight line. A satisfactory spiral angle is 5 deg. with the shear falling from the cutting direction. While the effect of a straight fluted cutter is not troublesome in milling a female thread, it can become a problem on most outside threads, and is one of the factors that makes it necessary to reduce the tooth load or feed per tooth about 40 per cent when cutting male threads as compared with cutting female threads. The main reason is to eliminate chatter and revolution marks and thereby improve the finish. It should be noted, however, that all the speeds and feeds given in the table have been worked out for straight fluted cutters.

(4) Hooks on cutting teeth should be as much as they will stand but not enough to permit the apex of a V-tooth to be readily chipped or annealed by overheating so that the point will become useless in a short time. A 5-deg. radial hook can be used on most steel jobs and also for the softer brasses. If the steel is not too tough, 7 to 10 deg. can be used safely. This hook angle must be taken into account when the tooth form or groove shape is developed so that the necessary modifications can be made.

For artillery shell work, the writer has had most success with cutter flutes ground radial or on the center line ("c.l." in the table.) It will be noted in the table that the feed per tooth for shell threading can be double that of nearly all other steel jobs listed. This is because of the free-cutting qualities of the manganese alloy, high sulphur steels like SAE x 1335 commonly used for shell work.

Malleable iron which will stand a good tooth load can be milled well with a cutter having a 5-deg. hook.

Hard bronze can be satisfactorily milled with a cutting edge from on-center line to a 5-deg. hook.

All aluminum applications listed use a cutter having a radial cutting hook of 20 deg. and a high peripheral cutting speed. The lighter

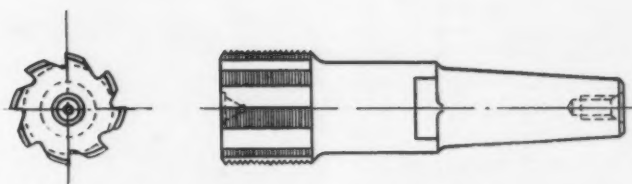
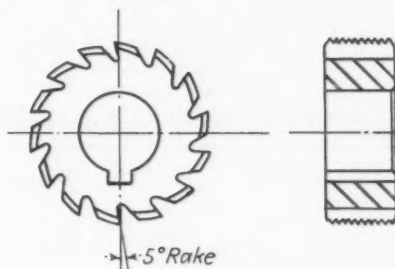
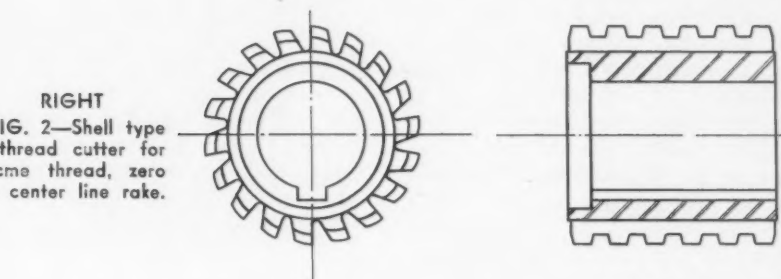


FIG. 1—Taper shank type of multiple thread miller. This cutter is designed to be sharpened on centers. The teeth have zero rake.

RIGHT  
FIG. 2—Shell type thread cutter for Acme thread, zero or center line rake.



LEFT  
FIG. 3—Smaller size of V-thread shell type thread milling cutter with 5 deg. rake.

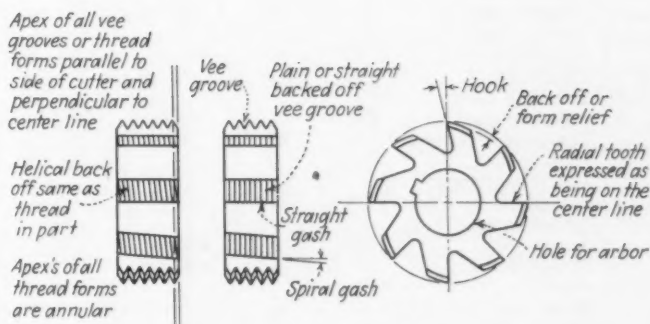


FIG. 4—Sketches showing difference between straight gashed and spiral gashed teeth. The V-grooves are annular, that is the pitch or helix angle is zero, but in the left sketch the backoff on the sides and top of the V is helical.

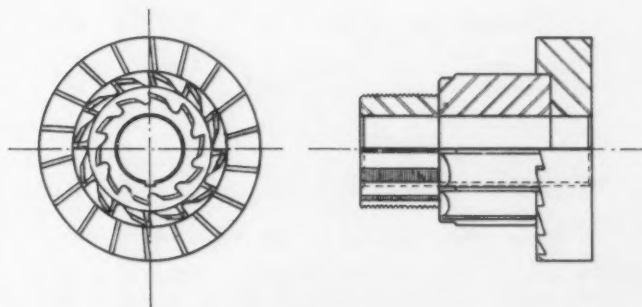


FIG. 5—Combination thread miller and form miller. This tool threads, counterbores and faces in one set-up and in the same cycle time.

the tooth load, the higher the speed required.

(5) Extreme care should be maintained to eliminate whip in the cutter arbor, particularly when milling threads in aluminum or soft brass. Failure to observe this precaution will result in dig-ins or gashes and scrapped work. The cutter should be kept as close to the spindle as it is possible to do so. Cutters should run true or concentric with the spindle to not more than 0.0005 in. total indicator run-out reading. More eccentricity than this will result in proportional inefficiency of the cutter.

It should also be obvious that the workpiece should be held rigidly in place so as to avoid any looseness that would permit vibration. This condition presents no unusual problem, since the work is held stationary. Special holding fixtures are always necessary. These fixtures are usually designed by the machine builder for each application. Fixtures should be of generous proportions to minimize deflections

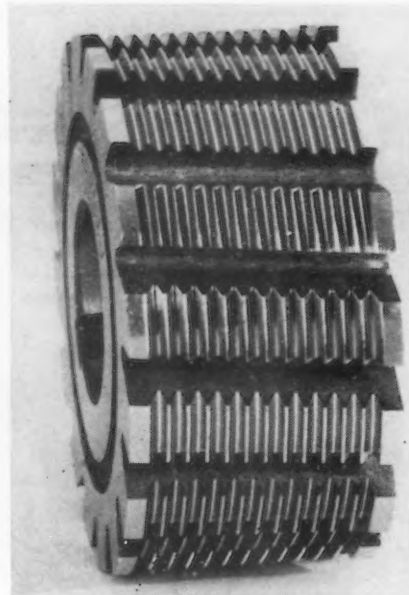


FIG. 6—Shell type Buttress thread milling cutter which has flat portions at each end for removing the "feather edge" produced at the ends of threaded sections. Photo courtesy of Detroit Tap & Tool Co.

either as a result of cutter load or overhang of the work, as in the example of an aircraft propeller.

Coolants are necessary for thread milling operations and should be supplied in copious quantities so as to help in washing the chips away. Good grades of cutting oils should be used for all steel work and malleable iron. Oils used for chaser type threading operations are suitable. Brass and bronze can be milled with good mixtures of soluble oil. Aluminum machines well with a mixture of one part of lard oil to four parts of kerosene. One well known aircraft engine builder uses one part of a high sulphur (12 to 15 per cent) lard base oil mixed with 24 parts of kerosene.

### Spark Plug Threading

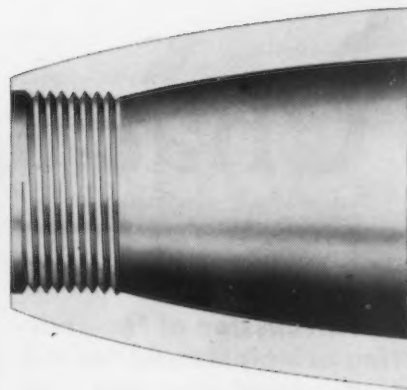
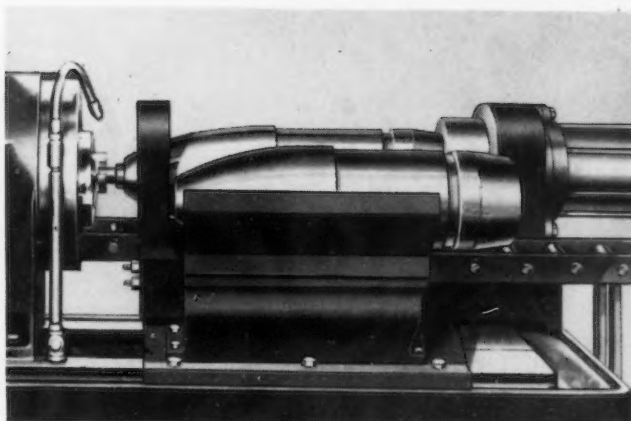
It will be noted in the table that there is quite a difference in the speeds and feeds used by various manufacturers in milling spark

Table I—Summary of Thread Milling Applications—Internal

Material	Part Name	Thread Details			Cutter Description			Speed, Ft. Per Min.	Feed Per Tooth	Cycle, Time, Min.	Notes
		Diam.	Pitch	Type	Diam.	No. of Teeth	Hook				
Aluminum	Cylinder head	5 1/4	12	Buttress	3	16	—	452	0.0028	1 1/2	
Aluminum	Crankcase	2 9/16	16	V	2	10	20°	753	0.0009	2	
Aluminum	Cylinder head	6	10	V	5 1/2	20	20°	518	0.0026	1	
Aluminum	Cylinder head	5 1/2	12	V	4 9/8	20	R.I.T.*	630	0.0013	2 1/2	
Aluminum	Cylinder head	5 3/4	8	V	5 1/4	20	20°	825	0.0028	1	
Aluminum	Cylinder head	6.12	10	Aero	5.58	20	20°	800	0.0030	—	
Steel R 28/32	Thrust nut	2 3/4	16	V	2	12	—	110	0.0017	—	
Steel R 28/32	Breech or tube extension	4 3/4	6	Acme	3 1/2	16	0.153	72	0.0019	10	60 pcs. per gr.
Steel R 32	Fuel injector nut	1 5/16	16	V	5/8	5	5°	74	0.0024	1	
Steel R 33	75 mm. shell	1.65	10	V	1 1/4	8	C.L.	103	0.0057	1	60/75 pcs. per gr.
Steel	4 in. illuminating shell	1.701	14	V	1 1/8	8	5°	105	0.0043	1	
Steel	Breech or tube extension	2.50	4	Acme	1 7/8	12	5°	93	0.0020	6	
Steel	Propeller hub	6	8	Buttress	3 7/8	16	5°	67	0.0025	11 1/4	
Steel R 33	Shell (shot)	1.65	10	V	1 7/16	8	C.L.	84.5	0.0029	1 3/4	
Steel	90 mm. shell	2	12	N.S.I.**	1 1/2	10	C.L.	79	0.0059	0.9	
Steel	3.75 in. shell	2	14	Whitworth	1 1/2	10	C.L.	78	0.0063	1	
Steel	Flyweight	1	16	V	.730	6	C.L.	84	0.0021	1 1/4	
Steel Br. 240-270	Shell	5/8	16	L.H.	1/2	5	5°	89	0.0023	1 1/2	
Steel	Torpedo nut	4	20	N.S.I.**	2	12	5°	96	0.0028	3 1/2	
Steel	57 mm. breech ring	6.42	4	Acme	4.5	28	5°	70	0.0020	12	
Malleable iron	Bearing lock nut	2 1/8	12	V	1 1/2	12	C.L.	119	0.0054	1 1/4	700/800 pcs. per gr.
Naval brass	Propeller shaft nut	3.383	12	—	2 1/2	16	—	460	0.0025	—	
Steel R 28/32	Gun barrel	1 1/2	8	Acme	2 1/2	12	5°	92	0.0016	2	
Steel	Gun barrel	1 3/16	18	V	2 3/4	12	.195	100	0.0030	1	
Steel	Gun barrel	1 7/16	8	V	2 3/4	12	(99 spiral)	87	0.0011	4 1/2	
Steel	Gun barrel	2 1/2	4	Acme	2	12	10°	99	0.0009	6	
Steel	Spark plug	18 mm. (0.705)	1.5 mm.	V	1 1/4	7	7°	180	0.0063	55 sec.	
Steel	Propeller blade	4 1/2	8	Buttress***	2 1/2	12	5°	94	0.0017	9 1/2	Two cuts in 19 min.
Steel	Spark plug	18 mm.	1.5 mm.	V	1 I.D.	8	5°	298	0.0016	—	
Steel	Spark plug	18 mm.	1.5 mm.	V	1 I.D.	8	C.L.	100	0.0028	1 1/2	
Steel	Spark plug	1/2	20	V	3/4	8	C.L.	76	0.0019	1 1/2	

\* R.I.T.—Remove imperfect thread and form seal. \*\* National Standard 1. \*\*\* Modified. All Rockwell readings (R) are on the C scale. Br. = Brinell hardness.

FIG. 7—Set-up for milling the nose thread on a  $4\frac{1}{2}$  in. H. E. projectile. Time: 50 sec., floor to floor, to mill 2 in. diameter, 14th per in., and finish conical seat concentric with this thread. Shell is brought to miller on roller conveyor and is clamped by air cylinder on rear of fixture.



plug shell threads. This lack of agreement is due to different viewpoints of process engineers and in some instances to recommendations on the part of equipment manufacturers. In some plug designs, the nickel electrode is butt welded in place and part of this material comes within the thread region. Nickel is a tough material to machine and its presence must be taken into account in selecting speeds and feeds.

Two cutters marked "I.D." are female cutters. Whether to use male cutters or female cutters is a very controversial question at the present time. Female cutters have more teeth in contact with the work at all times than it is possible to have with a male cutter and hence have a lighter tooth load. They usually have double edged blades, which have to be reset to bring the second set into action. The heads have to be extremely accurate and are high in cost. Male cutters, on the other hand, are cheaper and are obviously easier to grind. They have a shorter life per grind because of the greater tooth load.

The reason for the difference in the tooth loads is that when a male cutter rotates around a male part, one tooth of each annular set is

cutting at a time, while a female cutter engages three or four cutter teeth at a time, thus dividing the tooth load or the amount to be removed per tooth. For example, if a male cutter for a  $\frac{1}{2}$ -in. 20-tooth spark plug shell has a feed of 0.0019 in. per tooth, a male cutter actually removes that much metal per tooth. If a female cutter has a nominal tooth load of 0.0028 in. and three teeth are in the work at the same time, the resultant load per tooth actually is only about 0.0009 in. or half of what it is for the male cutter.

In this connection it should be mentioned that the feed-into-depth

rate should be approximately half the rate of feed while cutting around the part.

#### Machine Details

The planetary type of thread miller made by the Plan-O-Mill Corp. will mill threads up to a maximum of 8 in. internal p.d. and  $1\frac{1}{2}$  in. external diameter. By the addition of an auxiliary head, the external milling range can be increased to 8 in. p.d. Axial feed of the cutter head is governed by a large diameter lead screw and is limited to  $\frac{1}{2}$  in. It should be remembered that the feed for any application need be only a little over one pitch. Spindle eccentricity is adjustable and permits holding size to the close dimensions required for Class III fits. The planetary feed motion is driven by a combination gear and belt to eliminate chatter. The number of planetary revolutions is controlled through an adjustable worm drive limit switch. Spindle and planetary feed motion are driven by separate motors of 3 and 1 hp., respectively. The entire cycle is automatic and can be varied from 15 sec. to 6 min. approximately.

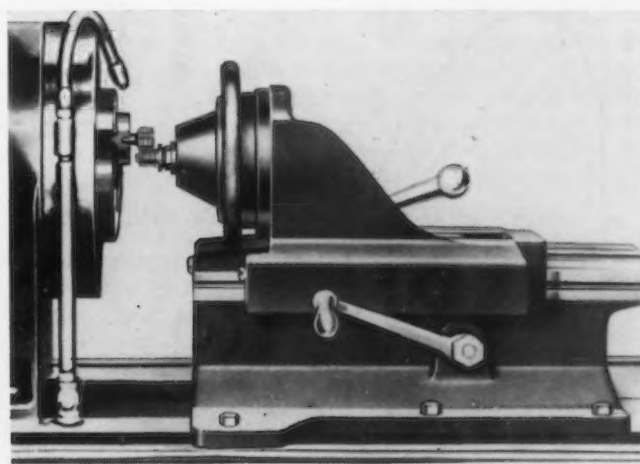
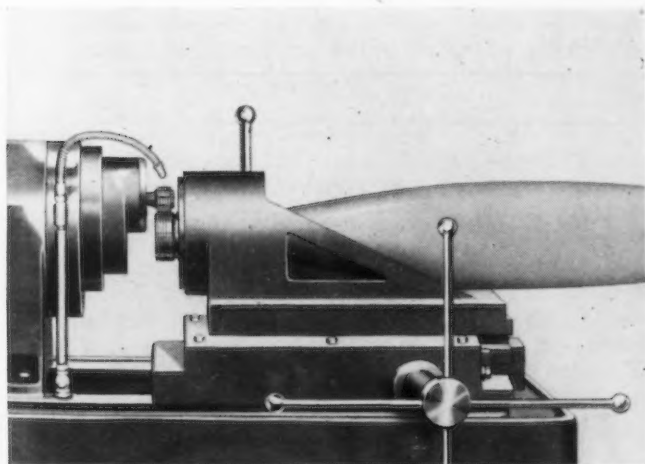
The photographs show some typical thread milling operations.

#### LEFT

FIG. 8—The propeller blade is as long as the bed of the machine but the heavy fixture holds it rigid while the  $4\frac{1}{2}$  in., 8 pitch modified buttress thread is milled. Cutting time 20 minutes. Set-up eliminates conventional indicating procedure which normally takes  $1\frac{1}{2}$  hrs. This Plan-O-Mill machine is equipped with an auxiliary head to increase the external diameter range.

#### RIGHT

FIG. 9—Typical spark plug shell thread milling set-up with work holding collet chuck.





# Characteristics of A. C.

**... A discussion of the operating principles and the relative advantages and limitations of the two general types of arc welding units.**

**S** ELECTION of an arc welder for a given job must be based on electrical, mechanical and economic factors. These include initial cost, operating cost, maintenance, efficiency, obsolescence, space factor, weldability such as ease of striking and holding the arc usability under all conditions and arc blow.

Arc welding machines can be classified into three general groups: (1) d.c. machines consisting of a generator driven by an electric motor or gasoline or diesel engine; (2) a.c. machines of either the transformer or motor-generator types, and (3) rectifier machines using either electronic tubes or oxide plates for rectification of the output of an a.c. transformer welder (not discussed in this article). Any one of these types may be a single-operator or multiple-operator set.

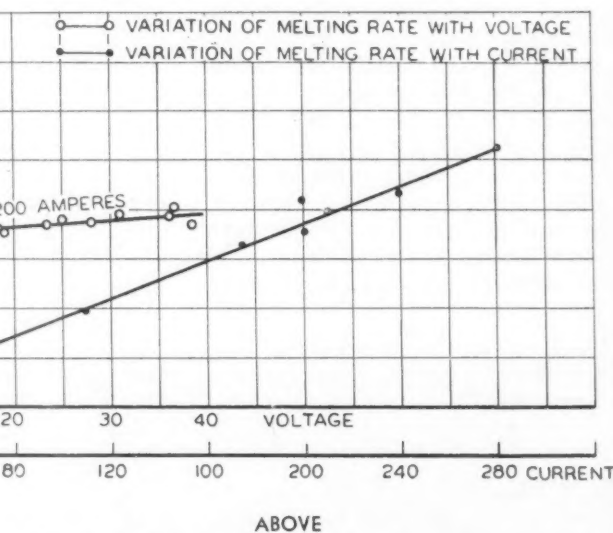
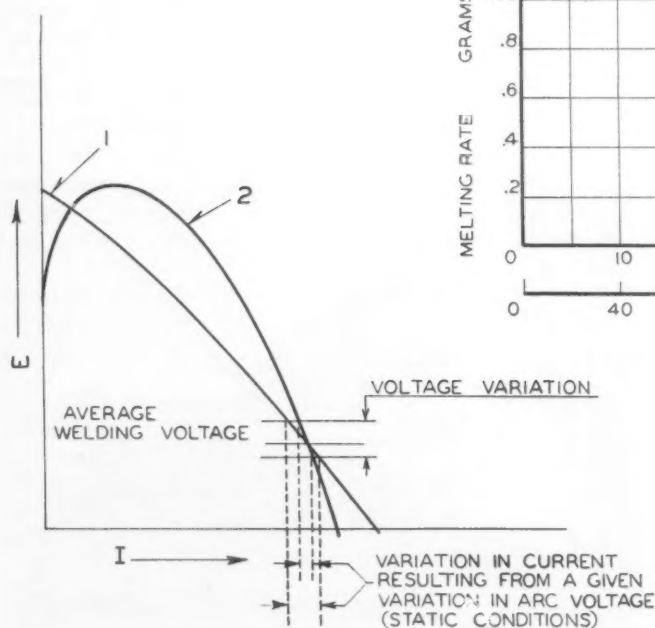
Some time ago five machines

were tested in the Westinghouse research laboratories. Each machine could have been considered to have ideal characteristics based on requirements established by different theories. These machines were tested by 20 welding operators in a way that made it impossible for the operator to know which machine he was using. One machine was given first choice by five operators, three machines were chosen by four operators each, and one machine was chosen as best by two operators. Choices for second and third best were similarly divided.

During the test each operator was asked what welding characteristics he considered desirable. The answers indicated that each had his own individual preference for a smooth, quiet arc; a short crackling arc; the possibility of drawing out a long arc, or of preventing a long arc; or the amount of spatter produced. Under the

conditions of the test some characteristics obviously are not critical, and weldability is a matter of personal judgment.

Voltage required by the welding arc varies over a wide range from zero at short circuit to at least 50 volts for long, "high-voltage" arcs. The welding machine must supply current at all of these voltages without too wide a variation in current. To meet this requirement, the machine must have a drooping volt-ampere characteristic. In other words, the machine should supply substantial currents at high voltages yet limit the short-circuit current. Two general types of volt-ampere characteristics can be used and are shown in Fig. 1. Curve 1 represents a continuously drooping characteristic from an open-circuit voltage above the maximum required by the arc down to short circuit. Curve 2 represents a characteristic having a moderate



**FIG. 2—Effect of current and voltage on melting rate of electrodes.**

**FIG. 1—Typical volt-ampere curves show the effect of variations in slope.**

# and D. C. Arc Welders

open-circuit voltage, a higher maximum voltage which will supply any normal demand of the arc as long as the arc is drawing current, and having a steel slope throughout the welding range.

With manual welding, it is impossible for the operator to hold an arc at constant length. Changes in current resulting from a given change in arc length depends on the slope of the volt-ampere characteristic as illustrated in Fig. 1. A machine with a steep characteristic produces small changes in current for a given voltage change and is known as a constant-current machine. A machine with a flatter slope produces a greater current change for a given voltage change and may be known as a constant-energy machine if the product of current and arc voltage is nearly constant.

## Voltage-Current Characteristics

Tests made on electrodes indicate that the melting rate is nearly proportional to the arc current and largely independent of arc length or voltage. This is illustrated in Fig. 2. Sometimes a steep volt-ampere characteristic is desirable for maximum speed and quality. In other cases a flat curve may be desirable to permit the operator to control the current within narrow limits by lengthening or shortening the arc. The particular job may therefore determine the best type of volt-ampere curve.

Average arc voltage during welding may vary between 15 and 50, depending on the electrode and process used. In addition, different types of disturbances cause the arc to elongate and increase its voltage above the average value. It is essential that the open-circuit voltage in curve 1, Fig. 1, or the maximum voltage in curve 2 be above the maximum arc voltage, and that the welding machine delivers substantial currents at maximum arc voltage. Otherwise the arc may be inter-

By CHARLES H. JENNINGS and  
ALFRED B. WHITE

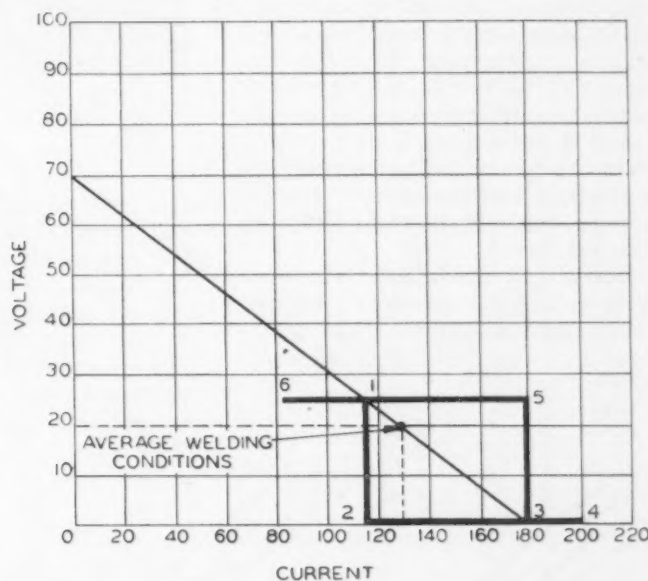
*Westinghouse Research Laboratories,  
East Pittsburgh*

rupted by prolonged disturbances. Actual tests show that with a machine having a characteristic of the type shown by curve 1, the open-circuit voltage must be approximately 50 per cent greater than the maximum average arc

by puddling or whipping motions are relatively slow. Current changes then follow voltage changes as determined by the volt-ampere curve that is, an increase in voltage produces a decrease in current and such changes are readily followed by meters.

Other changes are more rapid. Electrode metal is transferred to the work in a series of drops, the larger of which short-circuit the generator momentarily. The short

**FIG. 3—Dynamic characteristics of machines are just as important as static characteristics in determining weldability.**



voltage. With a machine having a characteristic such as curve 2, the open-circuit voltage need be only about two-thirds of the maximum average arc voltage.

There is some question about the effect of open circuit voltage on the ease of striking the arc. Since safe open-circuit voltages usually cannot break down even a small air gap or a thin layer of scale, metal-to-metal contact must be made between the electrode and the work before the arc can be struck. The arc is therefore established from short-circuit conditions. Changes in arc voltage caused by variations in the feeding rate of the electrode, or

circuits may occur up to 40 times per sec. and last for more than 1/40 sec. Voltage changes at the start and finish of the short-circuit period are practically instantaneous—far too fast for a meter to follow—too fast even for the current changes to follow closely.

## Rapid Short Circuits

Because of the inability of a generator to adjust its current as rapidly as the arc voltage changes during short circuits, the volt-ampere relations do not follow the static characteristics shown in Fig. 1. The actual volt-ampere relations are more nearly represented by the rectangular loop

shown in Fig. 3. The electric arc has essentially a constant voltage characteristic for a given arc length and may be illustrated by the line 1-5, Fig. 3. During the short-circuit period, the load characteristic is also a constant-voltage (nearly zero volts) curve, as the line 2-3. During the welding process, the arc voltage changes instantly from line 1-5 to line 2-3 at the start of a short circuit caused by drop transfer, and returns instantly at the end of the transfer. At the moment of short circuit, the voltage drops from point 1 to point 2. From point 2, the current starts to readjust itself to the short-circuit value of the static curve, point 3, and will reach that point if the short circuit is maintained long enough. With some machines the current may overshoot to a value such as point 4, from which it will return to point 3.

At the moment the drop transfer is completed and the arc is re-established, voltage rises vertically as to point 5, and the current starts readjusting itself to the static curve, decreasing to point 1 and possibly undershooting to point 6 before reaching a steady state at point 1. The amounts of overshoot and undershoot depend on the dynamic characteristics of the generator.

Area and position of the rectangle, of course, depend on the length of the individual short cir-



**W**ELDERS of the a.c. type have some advantages on work like this, with angles and corners, because arc blow is reduced.

cuit. Average value of the current and voltage during these variations is the value indicated by the voltmeter and ammeter connected to measure arc voltage and current. The effect of variations from the average values on weld quality is not entirely known.

Two facts are known, however.

High overshoot currents tend to increase spatter loss; low undershoot currents may cause the arc to extinguish. Constant-potential and a.c. welding machines have no undershoot or overshoot. Single-operator d.c. sets do have undershoot and overshoot, the magnitude depending on the design.

What has been said of d.c. sets may also apply to the characteristics of a.c. sets if polarity changes are considered. However, a.c. sets do not have overshoot and undershoot comparable to that of single operator sets.

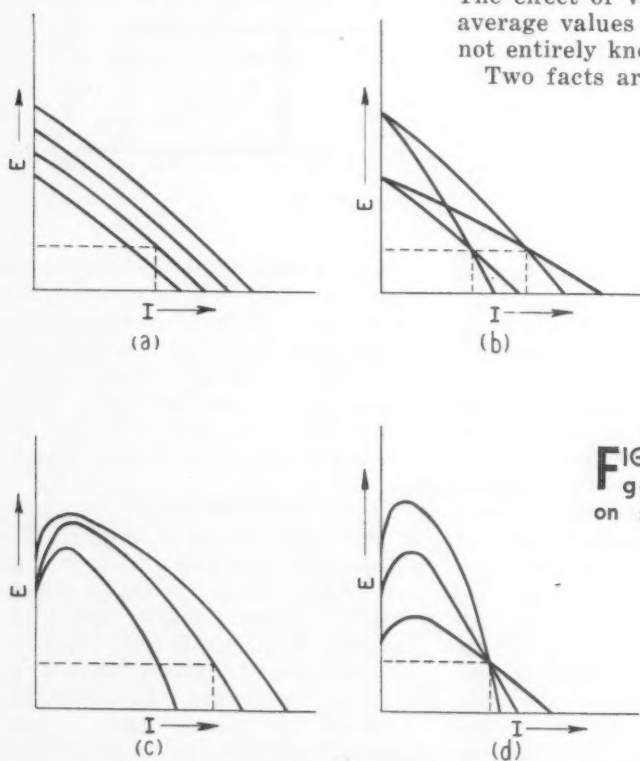
#### Single-Operator D.C. Machines

As the name implies, single-operator d.c. machines are designed to deliver power to only one operator. The most important designs fall into three general groups:

1. Separately excited, differentially compounded. The machine may have a shunt-field control alone, or a shunt-field control and a series-field control.

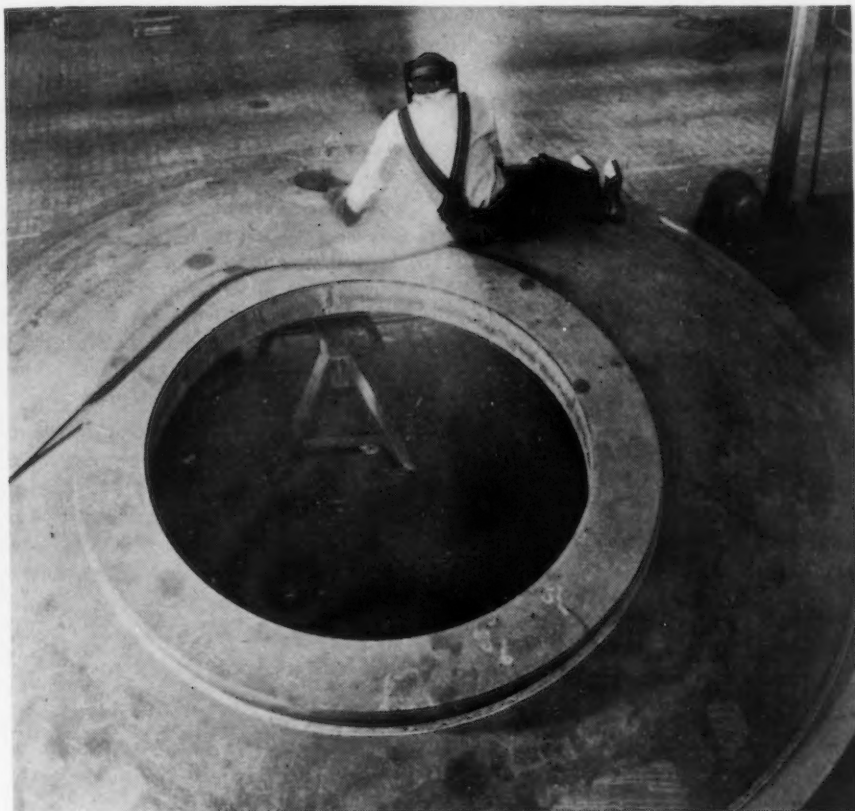
2. Third-brush excited, differentially compounded. Control may be obtained in some machines by shifting brushes, in others by a combination of shunt- and series-field controls.

3. The cross-field type of machine in which the current output is con-



**FIG. 4—**Influence of generator control on static volt-ampere curves.





**W**HERE heavy currents are used, a.c. welders have the edge because arc blow is less.

trolled by varying leakage flux between the main poles and by inserting resistance in the short-circuited brush circuits.

Any method of control changes the current by changing the volt-ampere characteristic. Shunt-field control varies the open-circuit voltage and produces a series of almost parallel volt-ampere curves, as in Fig. 4a. Series-field control and brush-shifting control produce a series of curves of different slopes originating from the same open-circuit voltages. A combination of shunt and series-field controls makes it possible to obtain a given arc current at a given arc voltage for several different machine settings as in Fig. 4b.

Leakage-flux control on cross-field generators produces a series of volt-ampere curves with slightly varying slopes as shown in Fig. 5c. A second control which inserts a resistance in the short-circuited brush circuit makes it possible to change the slope of the volt-ampere curve for a given arc current as shown in Fig. 4d.

The need for dual-control welding generators to permit changing the slope of the characteristic for a given welding current is still an

academic question because no definite relation has been found between the slope and the weld quality.

The electrical efficiency of an induction-motor-driven d.c. generator is about 50 or 60 per cent at rated load, and the power factor ranges from 85 to 90 per cent lagging. Efficiency of a d.c. motor drive is slightly lower than that of an a.c. motor drive.

Because under normal conditions an operator welds only from 30 to 60 per cent of the time, no-load losses on single-operator sets become important. These losses are from 2 to 5 kw. for compound-wound generators, as compared with 2.2 to 2.8 kw. for cross-field generators. In cross-field generators the lower losses are ac-

counted for by the elimination of separate exciters, shunt fields and other elements.

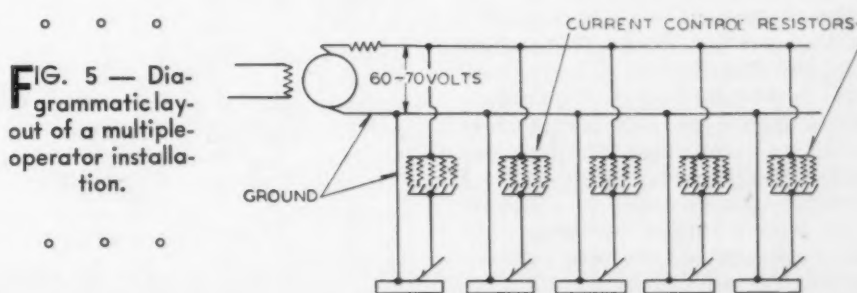
Heating of exciters, shunt fields and resistors has its effect in reducing the current as the welding set warms up. The reduction in welding current after a cold start is 5 per cent for a cross-field generator as against 25 per cent for some compound-wound generators after a 3-hr. run. Variations in line voltage produce much smaller variations in the cross-field generator than in other types. Current changes from these causes are important since they determine the uniformity of the arc current supply and the time required for resetting the current controls.

With gasoline or motor-driven sets, generator efficiency is the same as that of the electrically driven set. A 300-amp. gasoline-driven set requires from 13 to 16 gal. of gasoline a day. Oil cost for a diesel-driven set is about \$1 a day, but initial cost is from 50 to 60 per cent greater than the cost of a gasoline-driven set.

#### Multiple-Operator Machines

A multiple-operator machine is designed to supply current to more than one operator at a time. The generator is essentially flat compounded, consequently it is known as a constant-potential machine. Welding current supplied to each operator is limited by means of a resistance bank controlled by knife switches and connected in series with the arc (Fig. 5). The static volt-ampere characteristic is similar to that shown in curve 1, Fig. 1.

Multiple-operator sets are advantageous where the ratio of welding time to over-all time is low. On an average job an operator actually welds only one-third of the time, and though his welding current may be 150 amp., his average current is 50 amp. A 10,000-amp. multiple-operator installation would therefore handle 200 operators. Single-operator sets for 200 men would probably con-



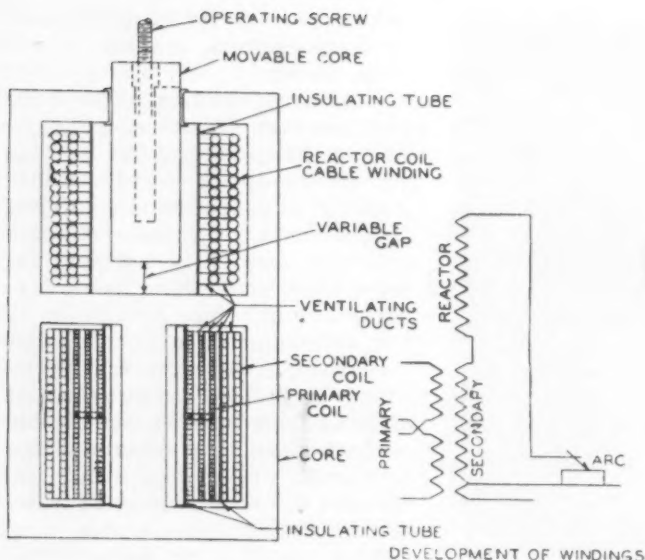


FIG. 6—Diagram of an a.c. welding transformer.

sist of 200 machines each of 200-amp. capacity, or a total capacity of 40,000 amp.

Primarily because a relatively large amount of energy is lost in the resistance banks, the over-all efficiency of the multiple-operator set is approximately only 32 per cent. However, because of the proportion of cleaning and setup time to welding time, the no-load losses of the single-operator sets during the no-welding periods reduce their over-all all-day efficiency to about the same figure on a similar job.

Cost of a multiple-operator set for an installation as used in this same example would be less than the cost of the single-operator sets. Multiple-operator sets provide the possibility of power-factor correction through a synchronous motor and require less floor space. A multiple-operator set is not portable. A shutdown would force all operators on a multiple-operator set out of work. The sales of multiple-operator equipment have increased some 20 times in the last three years.

#### A.C. Machines

There are two general types of a.c. machines—transformers and motor-generator sets.

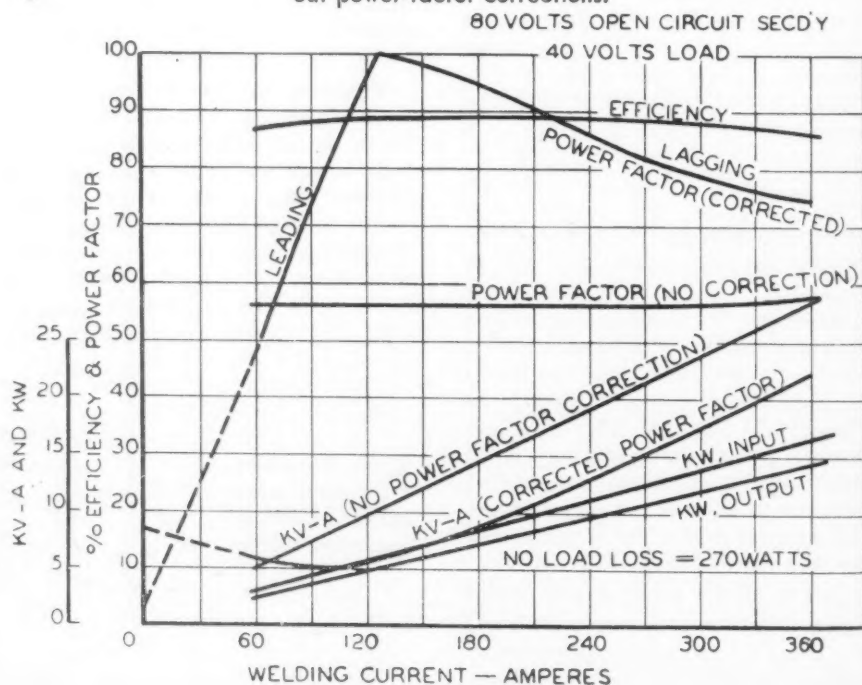
The transformer type, shown in Fig. 6, consists of a transformer with a reactor for current control and arc stabilization. Current control is obtained by a movable-reactor core, a movable transformer coil, or (for the smaller machines) a tapped reactor coil. A reactor can be used in conjunction with a tapped secondary coil for open-circuit voltage adjustment.

improved by the use of capacitors. The corrective capacity of the capacitors should be based on average operating conditions and on the diversity factor where several welders are operating from the same power lines. Too much correction may be as bad as none at all and 80 per cent lagging power factor is considered to be an economical value. Fig. 7 compares the difference in power factor and kva. input for a transformer welder with and without an average amount of correction.

Motor-generator a.c. sets generally produce a high-frequency arc current of from 180 to 240 cycles. Current control is obtained by an adjustable series reactance, producing volt-ampere characteristics similar to those of transformer welders with plain reactance control. Overall efficiency approaches 65 per cent and the power factor of the induction-motor drive is about 65 per cent at 40 volts full load. No-load losses approach 3.0 kw. on the machines of higher ratings.

A comparison of the two types gives the transformer welder the advantages of higher efficiency, lower no-load losses and with proper correction, higher power factor. The transformer has no high-speed moving parts to require maintenance. On the other hand the motor-generator set type

FIG. 7—Performance of a 300-amp. a.c. transformer welder with and without power-factor corrections.





may be driven from a 3-phase source.

The motor-generator set produces frequencies of from 180 to 240 cycles as compared with the 50 or 60 cycles produced by transformers. Arc current of higher frequencies has been claimed to produce a more stable arc, but the reactance method of arc stabilization used in both types is unaffected by frequency.

Multiple-operator transformer welders comparable with d.c. multiple-operator sets have been built with as many as 24 welding stations to one transformer.

### A.C. Versus D.C. Machines

It is impossible to make any specific rules for selection of machines, but if individual conditions are known, the choice between a.c. and d.c. becomes an easy matter.

**Electrodes.** Bare electrodes cannot be used with a.c. machines satisfactorily, but this is not necessarily a disadvantage, since nearly all manual welding is done with coated electrodes. It is possible, with few exceptions, to find a suitable a.c. electrode to weld any type of ferrous material, including austenitic stainless steel and high manganese steel and cast iron, and to produce results comparable with the results obtained with electrodes designed for direct current alone. Many hard facing electrodes are also suitable for use on alternating current.

The principle types of electrodes that cannot be used on a.c. machines are carbon, aluminum, copper alloy, nickel, Monel metal and Inconel, and bare steel electrodes. Electrodes of these types are available for use with d.c. machines. Any electrode that can be used with alternating current may also be used with direct current and duplication of stocks for both types of machines is not necessary.

**Weldable Materials.** The materials which can be welded with a given type of current depend on whether or not an electrode is available for that type of current.

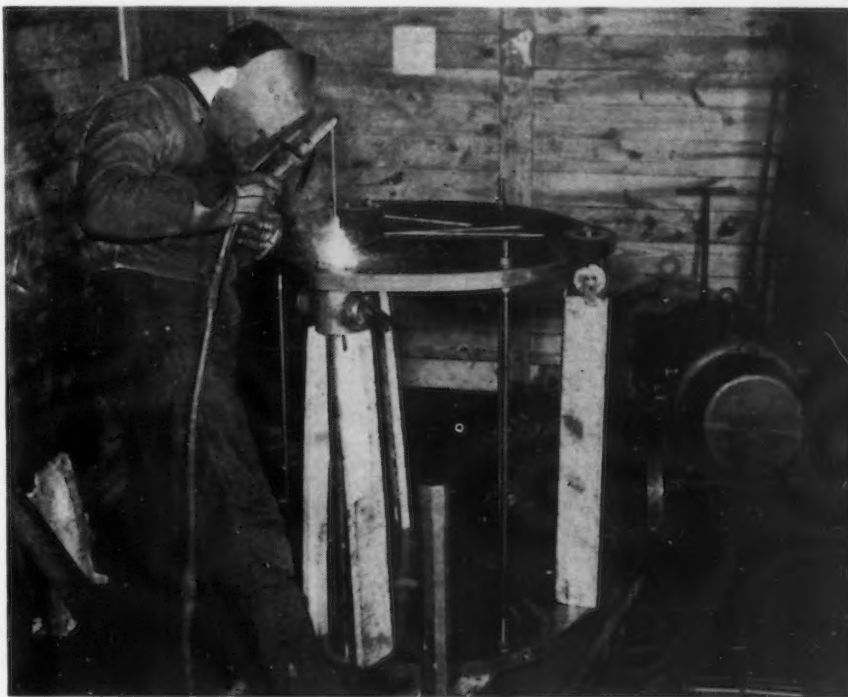
**Weld Quality.** Physical properties obtained from all weld-metal test specimens made under identical conditions and with the same electrodes show that there is no difference in the weld quality when either alternating current or direct current is used. Some a.c. electrodes will produce physi-

cal properties comparable with most ferrous electrodes designed for direct current alone.

When an electrode suitable for either a.c. or d.c. welding is used, tests show no difference in penetration at the joint. X-ray examination of welded joints shows that satisfactory welds can be made with either type of current. In the vertical and overhead positions, a.c. welds often appear to have slightly better soundness,

moment the operator started to move his hand and the moment the arc picked up.

Other factors affecting the ease of controlling the arc, with the exception of arc blow, in general produce no choice between alternating current and direct current. The relative lack of arc blow makes a.c. machines particularly adaptable on structures containing many angles and curves, and where electrodes of large diam-



**F**OR work on non-ferrous alloys, d.c. welders are essential because suitable a.c. electrodes are not available.

probably because of the reduced arc blow with alternating current.

**Welding Speed and Efficiency.** Here again, extensive tests between alternating current and direct current made with several grades of electrodes suitable for either type of current and run in all positions indicate that the power source (a.c. or d.c.) has little or no effect on deposit rate and deposit efficiency.

Ease of striking the arc is important and the average results of more than 700 starts on different types of electrodes, in different positions, and with new and used electrodes show the time required to strike an arc with a 60 cycle transformer to be equal or less than the striking time required for constant-potential and single-operator d.c. sets. Average striking times varied between 0.52 and 0.60 sec. for the time between the

eter and heavy arc currents are used. Arc blow, because of its disturbing effect on the arc, reduces the quality and speed of welding.

**Maintenance Costs.** The a.c. transformer type of welding machine has no rotating parts and consequently it is to be expected that it will have lower maintenance costs than the rotating equipment.

Satisfactory welds can be produced with all types of welding equipment—a.c., d.c., single-operator and multiple-operator sets.

Choice between single-operator and multiple-operator sets is dependent upon cost, possible power-factor conditions and work requirements. The multiple-operator set is advantageous where ratio of welding time to over-all time is low and the current per operator is low.

(CONCLUDED ON PAGE 120)



# Incentive For Production

By J. M. DUGAN  
and G. D. GRIFFITHS  
Supervisors, The Ohio Steel Foundry Co.

... An incentive wage system, based on a study that took more than a year to complete, has been worked out and put into operation by the Ohio Steel Foundry Co., Lima, Ohio, for roll turning and machine operations.

OF vital interest to the management of all plants concerned with the machining of rolls now that maximum production is so necessary and the supply of skilled labor so restricted is an incentive system for roll machining. It is not the purpose of this article to present an argument concerning the value of incentive wage systems, as the important part various systems of this kind are now playing in almost every branch of industry is sufficient evidence that they are necessary and desirable for greatest productive effort.

However, any work organization method that tends to bring out a worker's best efforts without imposing undue strain or allowing the chance for increased pay to encourage a workman to overexert himself, and, which rewards the workman fairly for any better than average performance, is a desirable system. Incentive or bonus payment systems have been widely used in the steel industry for many years, and, while the complaints that have arisen due to various difficulties in their operation have been long and sometimes loud, nevertheless these systems have been retained for the most part. Because of the complexity of the various processes in the production of steel, it is difficult to organize a system that can reward better than average effort fairly without resorting

to a series of formulas beyond the understanding of all but the few technicians who compose them. And so, it has often been the complaint of steel men that they are unable to follow the method used in arriving at the total of their weekly pay check and, often their foreman can be of little help. It does not seem that a man can lend his best efforts to an incentive system the workings of which he cannot understand.

After a plant expansion program, the roll machine shop of the Ohio Steel Foundry Co., Lima, Ohio, was the only production department in the organization which was operated on a straight hourly wage basis; incentive wage systems having been developed to fit the type of work being performed in all

other departments. During the years that rolls had been produced at the Ohio Steel Foundry Co., many piece work systems had been studied for possible application to roll machining, but all had been rejected as impractical. It was decided to develop a system that would avoid the difficulties which had caused other methods to be abandoned and which would fit exactly the roll machining process of the plant.

## Cost Records

With this idea in mind, a system for keeping cost records was set up in January, 1940, as it was believed that an accurate summation of costs, compiled by operation, was necessary for the proper setting of rates. To obtain this cost data the following procedure was established:

At the end of each shift, every workman was required to fill out the Daily Time Distribution Report shown in Fig. 1. Since most of the operations in this type of work are quite lengthy, the filling out of such a card does not involve much work for the roll turner. These cards

Form 106 DAILY LABOR DISTRIBUTION			
Job No.	Description of Work Performed	Hours	
8352	Carnegie Illinois 18½ x 52 - Rough turn neck & body	8	
Name	Don Earl	Clock No.	803
		Total Hrs.	8
Approved	J.D.	Date	2/10/40

FIG. 1—This card, showing the job number, customer's name, the operation performed, time worked and the worker's name is filled out daily by each workman.

ry  
ut  
rt  
e  
e  
h  
k  
s

After a year's accumulation of totals on these comparative cost sheets, it was felt that there had been collected sufficient background of recorded experience to enable setting machining rates in a fair

In other words, a detailed record of the output of the machining division as operated on a straight hourly work basis and for which output the company was satisfied to continue the payment of normal hourly wages was developed. In an effort to obtain greater production the company now proposed additional pay for any increase over average output, which standard had already been set up by the workmen themselves during the period used as a base for the records.

THE IRON AGE, August 20, 1942—57

SERIAL	OUT OFF 1ST CUT DRILL SHIPE FIN. POLISH GRIND										K-METAL	1 1/2" X 12"	
	CENTER HEAD	RIGHT TURN	WABBLER	WABBLER TURN	NECKS	SCALE						PASS ROLLS	FINISH SHIP
5135	1	60 1/2	70 7/8	511 1/2	100 3	187 6	448 2	156				N.R.T.	4-5-40
5137	1	60 2	102 3	334 1/2	100 3	187 6	444 2	126 1/2	97			N.R.T.	4-5-40
5140	1	60 1	70 3/4	206 2	160 1/2	82 5	325 1/2	117				N.R.T.	4-5-40
5141	1	60 1/2	97 3	219 1	80 2	102 5	375 1	78 1	63 2			N.R.T.	4-5-40
5144	1	60 1/2	67 7	419 1/2	125 4	269 5	375 1	78 2 1/2	133			N.R.T.	4-5-40
5146	1	60 1/2	113 6 1/2	412 1	80 1 1/2	105 6 1/2	474 3	227 3 1/2	204			N.R.T.	4-5-40
5147	1	60 1/2	113 5	315 1	80 2 1/2	158 11	849 2	156 1	63			N.R.T.	4-5-40
5150	1	60 3/4	251 13	1069 1/2	121 2	102 4	292 1 1/2	103 1 1/2	132			N.R.T.	4-5-40
5151	1	60 2	106 11	774 1	78 2	102 8 1/2	621 1	51 3 1/2	228			N.R.T.	4-5-40
5153	1	60 1 1/2	133 9	527 1/2	42 3 1/2	203 17	1242 4	278 2 1/2	161			N.R.T.	4-5-40
5156	1	60 1 1/2	117 7	477 1	65 2	102 4	300 2	156 4	236			N.R.T.	4-5-40
5136	1 1/2	90 1 1/2	70 13	357 1	83 1 1/2	75 6	528 1	78 3	189			NECKED	5-14-40
5138	1	60 1	70 7	477 1	60 2	110 11	811 1	78				NECKED	5-14-40
5139	1	60 2	126 3	189 1/2	42 1 1/2	113 15	1115 1	78 2	130			NECKED	5-14-40
5142	1	60 1 1/2	98 4	260 1	60 1	70 23	1518 1	80				NECKED	5-14-40
5143	1	60 1	60 4	260 1	60 1 1/2	77 7 1/2	495 1 1/2	97 1	63			NECKED	5-14-40
5145	1	60 1 1/2	97 6	360 1 1/2	105 2	102 22	1192 3	191 2	130			NECKED	5-14-40
5148	1	60 1	75 4 1/2	256 2	160 1 1/2	94 12	1150 2	186 3 1/2	186			NECKED	5-14-40
5149	1	60 1	65 7	449	1 1/2	77 13 1/2	906 1	93 1 1/2	95			NECKED	5-14-40
5152	1	60 1	60 5 1/2	387 1	65 3	180 11	910 1	78 2 1/2	158			NECKED	5-14-40
5154	1	60 1	75 4	260 1	80 1 1/2	77 10	600 1	78				NECKED	5-14-40
5155	1	60 1	78 4	260 1	83 3	192 14 1/2	918 2	150 2	130			NECKED	5-14-40
5157	1	63 2	156 6	438 1 1/2	125 1 1/2	77 25	1819 3	230				NECKED	5-14-40
5158	1	65 1	78 4	270 1/2	40 2	102 10 1/2	812 1 1/2	77 1 1/2	95			NECKED	5-14-40

FIG. 3—A comparative cost sheet for various jobs is made up from the information contained in individual Cost Cards.

FIG. 4—This piece work sheet is posted at each machine and shop inspectors record the time to complete each operation on the machine.

ROLL NUMBER		SIZE	CUSTOMER	
8165		34" X 84"	Lukens	
OPERATION		TIME ALLOWANCE		
Rough Turn		2160 min.		
Leave 1/2" on body		1805		
" 1/2" on necks		355 Premium		
" 3/8" on shoulders				
" 1/2" on splines				
OPERATOR	START	STOP	NO. OF MINUTES	
CLOCK NO.	NAME			
1554	3:30 A.M.	7:00 A.M.	210	
1541	7:00 A.M.	3:00 P.M.	480	
1552	3:00 P.M.	11:00 P.M.	480	
1554	11:00 P.M.	7:00 A.M.	480	
1541	7:00 A.M.	9:35 A.M.	155	
			1805	
Time Operation Complete. 9:35 A.M. 4-12-41				
Inspector. V.R.				
REMARKS				

Practically all roll machining work can be divided into the following groups: (1) Cutting off the head, (2) rough turning or preparing the roll for heat treating, (3) drilling the wabblers, (4) shaping the wabblers, (5) finish turning or preparing the roll for grinding, and, (6) polishing the roll.

The Ohio Steel Foundry Co. premium payment system operates in this fashion. On a given size of roll, a standard number of minutes, determined from the records, is set up as the base time for completing each operation. The amount of time required in performing each operation is recorded and the amount of premium pay the workman is to receive is calculated by comparing the actual time with the base time. If an employee's performance falls below the standard times, he is not penalized as he continues to receive his basic hourly rate. When the time required to perform complete operations is short enough that the operation can be completed by one man in his shift, he depends entirely upon his own efforts to receive premium pay. In these shorter operations, the premium system reaches the height of effectiveness.

However, on many larger rolls, the time required to perform certain operations, for example, rough turning, overlaps several working shifts and several men have to share in any premium paid. When this occurs, all men working on the pooled operation share in the premium paid, according to the actual time spent on the operation. Thus, if a certain roll's standard time for



<i>CARBON 165-175</i>	<i>19 1/2 X 31 1/2</i>
Cut off Head	<i>OHIOLOY-SOLID</i>
Rough Turn	<i>105 MIN</i>
Drill Wabblers	<i>780 "</i>
Fin. necks for emery polish-turn D.W.	<i>75 "</i>
Shape Wabblers (small)	<i>140 "</i>
	<i>180 "</i>
<i>BETH STEEL-GAUTIER</i>	

FIG. 5—This is a card record of one of the rates for a specific operation. The rate setter maintains a complete card record of all rates used.

FIG. 6—On the reverse side of the piece work sheet (Fig. 5), the premium distribution for a job is figured, providing a quick determination of individual payroll premiums and a case history of a particular job.

<i>Premium Distribution</i>	
<i>Time allowed</i>	<i>2160 min</i>
<i>" required</i>	<i>1805 "</i>
<i>Premium</i>	<i>355 "</i>
<i>which</i>	$\frac{690}{1805} \times 355 = 136 \text{ min}$
<i>B Earl</i>	$\frac{635}{1805} \times 355 = 124 \text{ min}$
<i>Vance</i>	$\frac{480}{1805} \times 355 = 95 \text{ min}$
	<i>355 ✓</i>

the rough turning operation is 20 hr., or 1200 min., it would probably require the work of three men pooled in order to complete the operation. Supposing that worker A should charge 6 hr. time to this roll; worker B, 8 hr.; and worker C, 4 hr.; a total of 18 hr. or 1080 min. Compared to the standard time this shows a saving of 120 min. This divided proportionately among the three men would give A 40 min.; B 53 min.; and C, 27 min. These premium minutes would then be added to each man's daily earning at his basic hourly wage.

### Special Work

Whenever work of a special nature is introduced into any particular operation, it is necessary to make an allowance in the form of additional minutes added to the standard time for that operation. Also, it is necessary to compensate for any unusual delays, such as waiting for crane lift, etc. It was

decided that any delay exceeding 15 min. in time should be classed as unusual.

To sum up the reasons leading to the acceptance of the above plan: (1) The plan can be easily understood by the workmen, (2) premium payments can be readily calculated, (3) rate setting is based on previous performance, (4) many jobs can be placed on an individual basis, and, (5) prospect of increased pay keeps men from losing interest in their work when assigned to lengthy, tedious operations.

The final step in the development of the system was the drawing up of the necessary forms to control the actual operation of this system. Plant inspectors, responsible for the machining process at all stages, were charged with recording the time required to complete each operation. To enable inspectors to do this quickly without becoming involved in too much clerical work, a piece work sheet, Fig. 4, was drawn up and posted at each machine.

When a roll is to be set up on any of the machines, an inspector fills out a piece work sheet, entering all necessary information and the time allowance, received from the rate setter who maintains a complete card record, Fig. 5, of all rates used.

The rate setter must be informed of all changes in foundry practice, all changes in analysis, etc., as such changes affect the machining time required. The time allowance is the

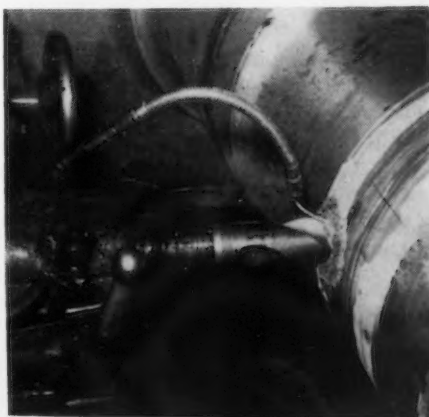


FIG. 7—From left to right, operations in roll machining shown are: Rough turning, drilling the wabblers, and finish turning.

floor to floor time required for the operation. As the inspector completes his checking of each operation, the roll is removed from the machine, the time of completion is recorded on the piece work sheet, and the sheet is initialed by the inspector who approves the completion of the operation. These sheets are turned in to a timekeeper, rates are checked against rate cards, and premium distribution is figured on the reverse side of the piece work sheets as shown in Fig. 6.

These sheets are next sent to the time office for the payroll depart-

ment when the weekly payroll is drawn up, and are then kept on file for any future reference, as they give a complete picture of everything that occurred during the machining of each roll.

This system, it is firmly believed, can be adapted successfully to any roll machining operation. It has been observed in operation during the past 15 months, during which period an increase of 20 per cent has been realized in the ratio of production to direct labor man-hours, attributed entirely to the incentive method of payment. The

wages of the workmen, of course, have increased accordingly, but an increase in production has been attained without adding to facilities or increasing the supervisory staff. This system has proven most satisfactory from the standpoint of management and workers alike, and many incidental operating difficulties have been overcome through this method of organizing machine shop work. Too, a standardization of machining work has been arrived at that could not have been brought about in any other way.

## Rapid Nickel Tests Speed Metal Segregation

TWO methods of spot testing nickel steels were discussed in a recent issue of *Topics*, an International Nickel Co. publication, by Bruce McCamant, chief chemist at the Spaulding and Jennings Works of the Crucible Steel Co.

Method No. 1, because it requires only two solutions and a piece of white blotting paper, is particularly applicable for use in the various operating departments of a steel works or manufacturer's plant. It is not necessary to send samples to the laboratory for identification; all that is required of the laboratory is to make up the two solutions.

Method No. 2, since five solutions and small pieces of filter paper are required for its application, requires specimens to be sent to the laboratory. It has, however, several advantages over the first method. It can be used on stampings, drop forgings, rounds, ovals, sphericals, or on any other irregularly shaped piece. A moistened piece of filter paper will adhere to all such materials, whereas a drop of acid mixture used in the first method would run off the surface of any piece that is not flat before accomplishing the desired objective.

As weaker solutions are made use of in method No. 2, this is the only method that can be used satisfactorily in testing plated steel for nickel, especially if an analysis is required of the steel beneath the plate. The acid absorbed by the filter paper will not eat through the thin plating of nickel. While it has been frequently necessary to determine what metal has been used to

plate fishing rods, wire, small drop forgings and stampings, method No. 2 has never failed in the detection of nickel.

The test by method No. 1, while not sufficiently accurate for a quantitative analysis, can be used to distinguish between steels containing about 3.5 per cent nickel, those containing about 1.0 to 1.5 per cent nickel, and those which contain no nickel. This method is frequently used, for example, in separating SAE steels of the 2300, 3100, 5100, 4100, and 4600 series, and similar low alloy or carbon steel compositions.

### Solutions Used

The solutions must be made accurately and, for ordinary use, 2 oz. of each will last for a long time. Solution No. 1 is as follows: 100 cc. of concentrated nitric acid; 25 cc. of syrupy phosphoric acid, 85 per cent; and 125 cc. of water.

Solution No. 2 is made up as follows: (1) 1 gm. of dimethylglyoxime is dissolved in 60 cc. of concentrated glacial acetic acid; (2) 10 gm. of ammonium acetate, c.p., is dissolved in 30 cc. of ammonium hydroxide, 0.90 specific gravity, c.p. When completed, the first solution is poured into the second solution, mixed well, and transferred to a glass stoppered bottle.

In making the test by method No. 1, a small area on the steel is cleaned with a file, emery cloth, or other means. One drop of the first solution is placed on the steel, allowed to react for 10 sec., and blotted with the blotting paper. A drop of the second solution is then placed

on the blotter. Very deep red on the blotter indicates 3.5 to 5 per cent nickel, pink indicates 1 to 1.5 per cent nickel, unalloyed carbon steel gives a brownish tinge, and stainless steel a carmine coloration.

In using the solution, a glass rod can be dipped into the bottle, and a sufficient quantity will adhere to the rod for testing purposes. Separate rods should be used for each solution or they will become mixed and will not give a clear and accurate reaction. It is better to use a clear glass dropping bottle for the nitric-phosphoric acid solution, and a colored glass "nose drop" bottle for the acetic acid-dimethylglyoxime solution.

The test for nickel by method No. 2 is likewise a simple operation. Following are the necessary reagents:

Ammonium persulphate, 15 per cent solution.  
Nitric acid, 10 per cent solution.  
Tartaric acid, 5 per cent solution.  
Dimethylglyoxime, 1 per cent solution in alcohol.  
Ammonium hydroxide, 1 part with a specific gravity of 0.90 to 1 part of water.  
Filter paper, pieces about 1/2 in. square.

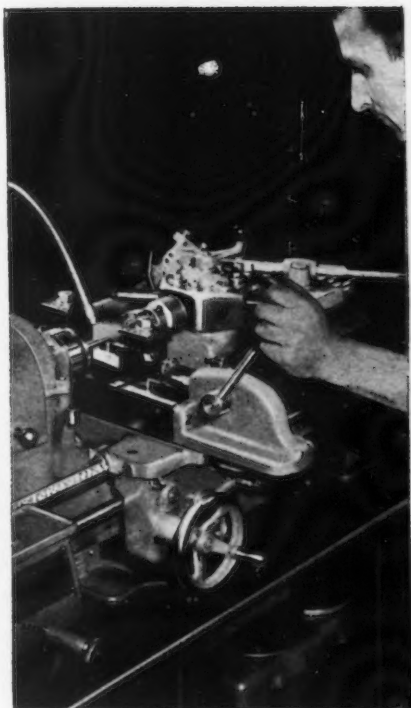
In making the examination, moisten a piece of filter paper with nitric acid, lay it on a clean steel surface for two minutes. Good contact is essential. Transfer the paper to a 100 cc. beaker. Add 5 cc. of ammonium persulphate and a few drops of nitric acid to be sure all iron stain is removed from the paper. Mix well. Add 10 drops of tartaric acid solution, 5 drops of the dimethylglyoxime solution, and 1 cc. of ammonia. Mix well, using a glass stirring rod. Nickel is shown by a red coloration.

# New Equipment . . .

## Machine Tools

Many design improvements and construction advances in turret lathes, shell lathes, gear finishers, boring mills, and other vital equipment have resulted from the heavy demand placed upon machine tool builders by the war industries. Some of these improvements are discussed here.

o o o

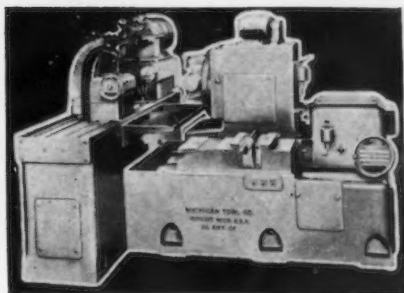


Small Turret Lathe

A NEW bench model turret lathe for chucking operations or bar work has just been introduced by the *South Bend Lathe Works*, South Bend, Ind. This lathe has a 10-in. swing over the bed and saddle wings, a  $1\frac{3}{8}$ -in. hole through the headstock spindle and collet capacity of 1 in. The lever operated bed turret indexes automatically and has an adjustable stop for each of the six turret faces. The lathe is equipped with a compound rest cross slide and with a hand lever cross slide, and the two are interchangeable. A quick change gear box provides 48 carriage, cross slide and thread cutting feeds. There are 12 spindle speeds, from 97 to 700 r.p.m.

### Gear Finishers

FOLLOWING closely on the recent announcement of a new 865 series of crossed-axis gear finished machines, *Michigan Tool Co.*, Detroit, is introducing a new series of machines for gears up to 24 in. in diameter. The new series 862, available in two sizes, permits selection of any of three different methods of finishing. In all methods the work drives the meshing cutter. In the first method, wide faced gears

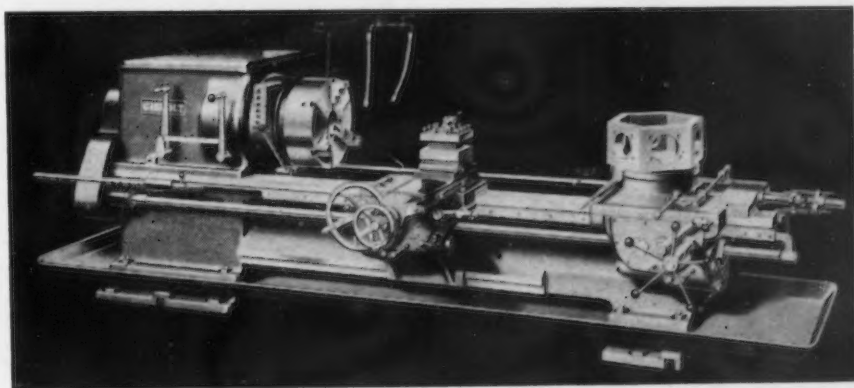


are finished by a motion in which the cutter, in addition to having an infeed toward the gear, is also reciprocated parallel to the axis of the gear. For quick finishing of gears having a face width narrower than the cutter, and also for close

shoulder work, a second method is employed. In this set-up the slide is set vertically, infeed is not used, and the cutting action is due to the crossed axis relationship between gear and cutter. The third method represents a combination of the first two. Provision is also made for crowning gears when required.

### Simplified Turret Lathes

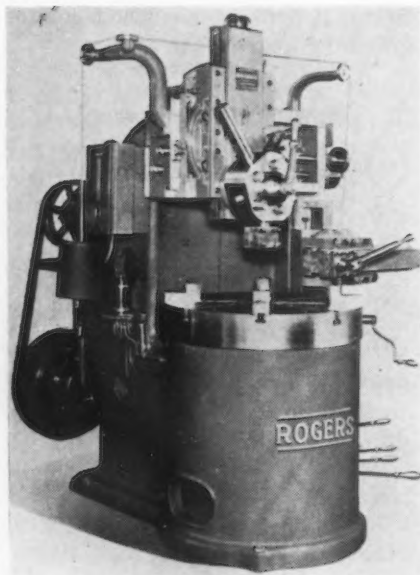
QUANTITY production of two new saddle type turret lathes, Nos. 3R and 4R, is getting under way in a recently expanded plant of the *Gisholt Machine Co.*, Madison, Wis. These lathes will be similar to the Gisholt 3L and 4L machines with changes to adapt them for quantity production. In view of their design for large-scale production, the machines must be built on readily available machine tools. For the same reason they will be provided with the most commonly used tools and attachments. Specifications of the 3R and 4R are, respectively: Spindle bore  $5\frac{1}{4}$  in.,  $9\frac{1}{4}$  in.; chuck 21 in., 24 in.; swing over ways  $28\frac{1}{2}$  in., 31 in.; swing over carriage wing 26 in.,  $27\frac{1}{2}$  in.; swing over cross slide  $21\frac{1}{2}$  in.,  $24\frac{1}{2}$  in.





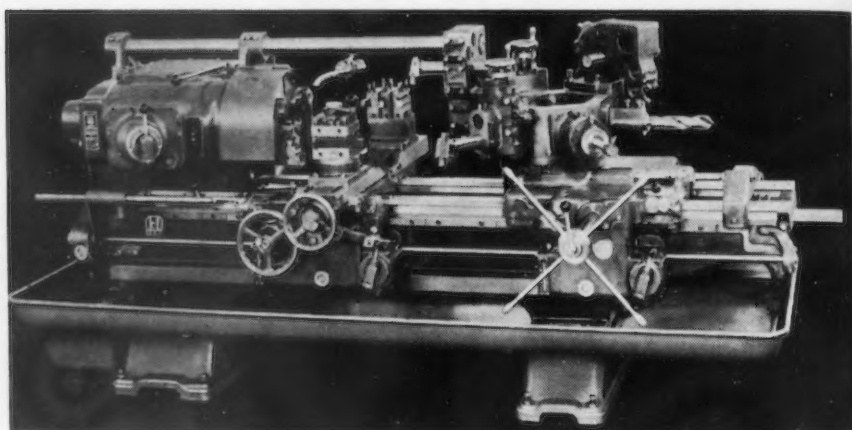
## Vertical Turret Mill

THE "Perfect 36" is the name given to a new turret mill produced by *Rogers Machine Works*, 125 Arthur Street, Buffalo, and designed for boring, drilling and turning. It has a specially designed swivel side head which can be set at any angle up to 35 deg. either way to simplify tool set-up for irregular pieces. A large bearing area on the tool stake and side rail, with positive clamping, are designed to assure rigidity on close tolerance work. A table level horizontal chuck allows the work to slide easily and quickly into position. Traverse is motor driven. Main and side heads have eight vertical and horizontal feeds each, and there are eight spindle speeds.



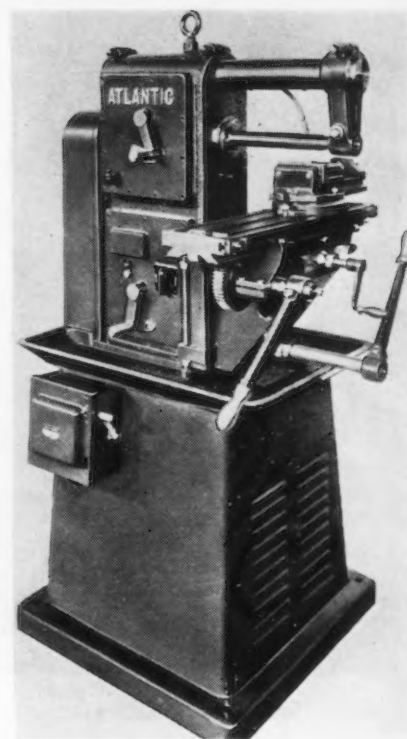
## Milling Speed Calculator

ENGINEERS of *Cincinnati Milling Machine and Cincinnati Grinders, Inc.*, Cincinnati, point out that men with insufficient shop experience are often unable to select the optimum cutting speed. In order to make it possible for the operator of a Cincinnati dial type milling machine to select the correct spindle speed for any combination of work, tool, and cutter diameter they have incorporated a built-in milling speed calculator in the line. The device is, in effect, a circular slide rule consisting of a stationary disk and two rotatable disks, with a semi-circular cover plate containing two apertures. No knowledge of mathematics is required to set a machine to the proper speed.



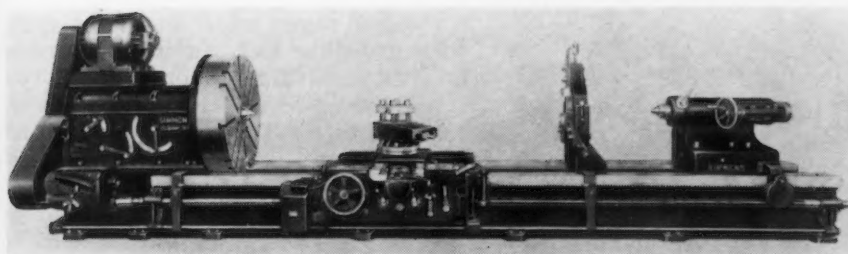
## Saddle Type Turret Lathe

TWO new saddle type universal turret lathes, the 9A and 10A, have just been put into production by the *Jones & Lamson Machine Co.*, Springfield, Vt. The former has a maximum round bar capacity of 3½ in. and will swing 23½ in. over the way covers, the latter will take a 5 in. round bar and will swing 27½ in. over the covers. On these machines there is not only power indexing of the hexagon turret, but also power traversing of the saddle, permitting the use of extra heavy walled turrets which can support larger boring bars without need for pilots. A unique feature incorporated in these units is a built-in power rapid traverse for the bridge type carriage and cross slide. This has an all-gear drive and is operated by a single lever through which all four movements of the carriage and cross slide, or a combination of these movements can be obtained. The bar-feed mechanism of these machines is in power operated by a reversible torque motor controlled by a switch on the headstock.



## Hand Milling Machine

ATLANTIC MACHINERY CORP., 149 Broadway, New York, has introduced a new No. 1 geared head hand milling machine. For high speed work on non-ferrous metals or low speed milling of tool steel it is said to be especially well adapted for variety and volume production work on small parts. The table working surface is 6 x 24 in., with a cross feed of 5½ in. Spindle speeds range from 150 to 675 r.p.m., with six forward and six reverse. Longitudinal feed by lever handle is 12 in., by crank 18 in., and vertical feed is 8½ in. The machine is arranged for motor drive through V-belts and equipped with a 1 hp. motor mounted in the base. It has a built-in coolant system and motor driven pump.

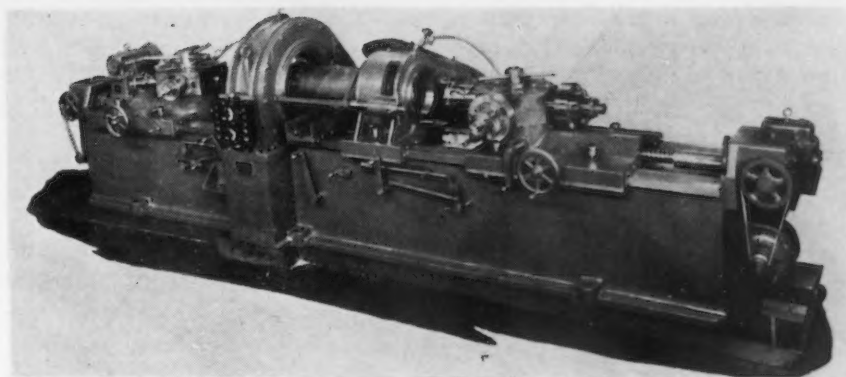
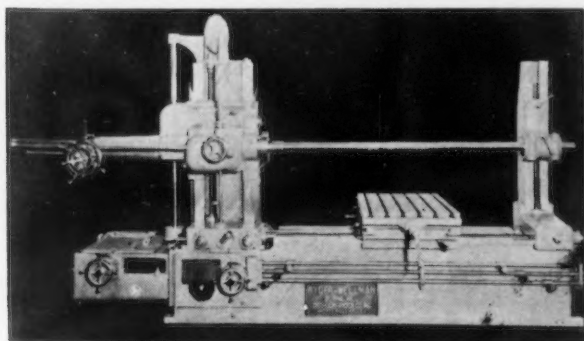


### Heavy Duty Lathe

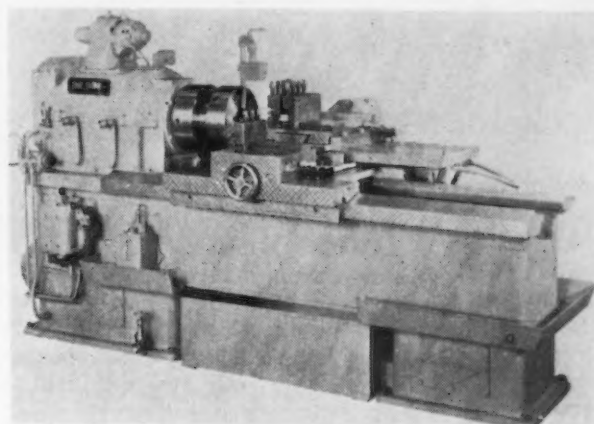
SEVERAL new design features have been incorporated in the 48 and 54 in. lathes built by *Simmons Machine Tool Corp.*, Albany, N. Y. The headstock design is simplified to provide either four or six speed changes with the minimum number of wearing parts. All gears and shafts in this section are made of SAE 4640 heat treated steel. The carriage is provided with an extra long bearing on wide flat ways. It is gibbed front and rear and can be locked in any position on the bed for heavy duty cross feeding. Power feed is provided for lateral and cross movements. The taper attachment gives a maximum of 5 in. per ft. for lengths up to 48 in. at one setting. The quick change gear box is a separate unit, fully enclosed, doweled and bolted to the bed casting.

### Horizontal Boring Mill

DEVELOPMENT of a heavy duty boring mill is announced by *Chisholm-Ryder Co.*, Niagara Falls, N. Y. Called the Ryder-Wellman horizontal boring machine, it has a vertical range of 1½ to 36 in. from table top to center of spindle, with a 36-in. traverse of bar and a 66-in. longitudinal traverse of saddle. Table cross feed is 38 in. The standard speed range of the new tool is 12 to 550 r.p.m., with a range of feeds of 0.0056 to 0.250 in. per rev. The company states that these speeds may be used throughout the full traverse of the bar and the mill will maintain the same



accuracy even at the extreme traverse. Direct reading dials, micrometer dials and verniers are designed to simplify operation and make adjustment easy to obtain. Speed selector controls are fitted with indicators and safety devices.



### Automatic Shell Lathe (Above)

FOUR models of the HYDROMATIC lathe built by *Norwood Engineering Co.*, Florence, Mass., have been designed for the various operations in turning shells from 50 to 155 mm. That used for centering and cutting off is fitted with a carriage on which is surmounted a rest car carrying a motor and center drill. The rough turning lathe features a cross slide

at the front equipped with three tool holders for roughing tools and a unique arrangement for a boat-tail tool. A back facing tool is mounted on a separate slide. A third model takes care of boring the nose, rough facing, rough reaming, finish reaming and facing, and is fitted with a manually indexed hexagon turret. A fourth model

cuts off and finishes the base of the shell and cuts the band groove.

### Bomb Machining Tool

A NEW unit for boring, facing and tapping both ends of 100 to 1000 lb. bombs in a single chucking is a development of *William K. Stamets*, Pittsburgh. The units are furnished to handle a given size bomb but can be modified for other sizes within this range. The machine consists of a bed supporting a center drive chuck, a rotating center rest, and a turret carriage on either side of the chuck.

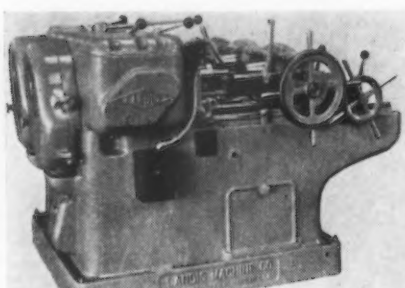
Carriages are fed by lead screws driven from the chuck and clutched to a motor for rapid traverse. The right hand turret carries a boring bar with facing tools at one or two stations and a collapsible tap at another. The other turret has a motor driven drill unit, a boring bar with facing tools, an undercutting tool when required and a tap.

Accuracy of alignment is such that no machining operation is required on the fin seat diameter of the bomb. The Stamets machine, shown above, is a modification of the Stamets double end coupling boring machine used in pipe mills.

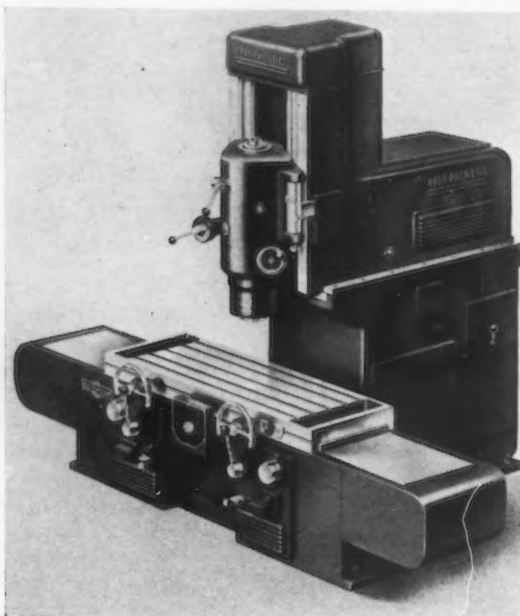


## Vertical Miller

THE No. 4 improved vertical milling machine developed by Reed-Prentice Corp., Worcester, Mass., has a bed that provides a long support for the square gibbed ways on the table, which have sufficient area to keep unit pressure to a minimum under heavy loads. The ways are pressure lubricated, and leveling screws in the base permit adjustment when installing the machine. A new type sheet metal cover



after the forming operation and prior to threading or tapping. The Lanco die heads ordinarily supplied with this machine are replaced with a special adapter supporting a boring tool of the replaceable bit type. Round serrated grips support the work in accurate alignment with the center of rotation of the spindle. In addition, a work support or cradle immediately back of the carriage front or vise of the machine aligns the work with the grips and facilitates handling of the shell. A lead screw feeds the work into the boring tool.



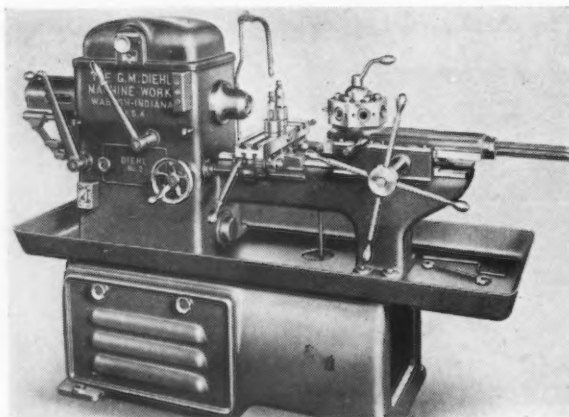
has been designed to prevent dirt and chips from falling in the ways. The table is cast of Meehanite, 7½ in. thick and has five T-slots and a coolant pocket at each end. The turret stop has four positions with adjustable dogs in each position. These dogs trip a limit switch stopping the head rapid traverse motor, and a dial indicator is provided for setting the head accurately. The spindle has 18 different speeds. Feed rates range from ½ to 37 in. per min. A separate handwheel control permits table feed rates up to 10 in. per min. regardless of the setting of the feed selector dial, and also permits the table to be set in increments as fine as 0.001 in., indicated by a set of two table dials.

## Shell Boring Machine

THE Landis Machine Co., Waynesboro, Pa., has developed a new adaptation of its Landmaco machine for removing excess metal within the bore of the nose end of shells. The operation is carried out

## Hand Feed Turret Lathe

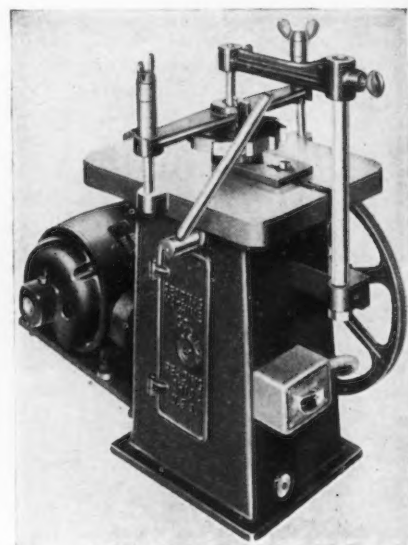
THE G. M. Diehl Machine Works, Wabash, Ind., for many years a manufacturer of woodworking machinery has entered the metal working field with a No. 2 turret lathe. The new tool has a 14-in. swing over the bed and a 6-in. swing over the cross slide. Automatic chuck capacity is 1-in. rounds, 11/16 in. square, and 7/8-in. hexagon. Two-speed constant-



horse power motor and lever operated three step belt shifter provide six speeds forward or reverse. The 3-hp. motor drives through V-belts, and a spindle brake is available as an extra. Turret power feed with six progressive feeds and automatic cutout can also be furnished.

## Bench Keyseater

THE keyseater, illustrated, made by the Reading Machine Co., Reading, Ohio, is fully portable if desired and is intended for bench



mounting. Its operation is described as being exceedingly simple and it is claimed to be adaptable to filing, sawing, slotting, oil grooving, etc., using a broach type cutter. The machine is capable of making heavy cuts and is intended for cutting tool steel, cast iron, brass, bronze, cold rolled steel, copper, aluminum and other metals. The clamp arm will hold any round, square or irregular shaped part. Chips from work fall directly into a chip drawer in the base thus eliminating clogging, it is claimed. Overall dimensions are: Height, 28 in. at top of stroke, 25 in. minimum, floor space, 16½ x 29 in. Stroke is 4 in. using a ¼ in. cutter. Recommended motor is ¾ hp.—1150 r.p.m.





## Anne Clark's refrigerator is helping to flatten Essen

If you have ever tried to lift a mechanical refrigerator, you know the weight of metal that is in them. So when Uncle Sam diverted to munitions all the critical materials in these precision machines, he took a long step toward shortening the war. Equally important, he gained the use of some of the world's foremost manufacturing plants with their skilled management, trained workers, and productive machinery.

In many of these plants, conversion from refrigerators to war materials was speeded up and made smoother by the cooperation of the

Revere Technical Advisory staff. For Revere not only furnishes industry with sound copper alloys, but also supplies practical assistance in methods of processing and fabricating.

Today, every ounce of copper goes directly into the essentials of warfare. There is none for any other use. Fortunately, Revere is well prepared, with modern plants, improved machines and advanced techniques, to fill a heavy share of our country's needs. And in Revere's laboratories research is tirelessly pressed forward to help shorten the hours before victory.



The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

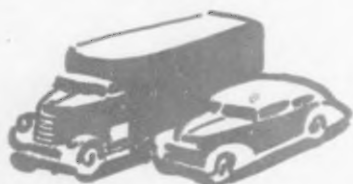
### REVERE COPPER AND BRASS INCORPORATED

*Founded by Paul Revere in 1801*

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK

# Assembly Line . . .

• "Pressuring" by a few employees, without consent of union leaders, displaces strikes as problem in some Detroit plants . . . Wages, hiring and firing frozen in tool and die industry.



**D**ETROIT—When strikes were outlawed in war plants by the mutual consent of unions and the Government, industry breathed a sigh of relief, but it was found that the relief was rather short-lived. A vicious new type of pressure method has come into the fore in the Motor City and is especially prevalent in the tool and die industry.

When the demands of labor through the unions are not met by a manufacturer, he is quite likely to walk into his shop some morning and find that the employees of the affected departments have quit their jobs enmasse. In many instances when such a situation arises the manufacturer finds that it is more costly to operate the plant with these departments off than it is to close down the plant entirely, and consequently he must either close down the plant or meet the demands of the men.

Naturally, the union denies any knowledge of the incident, but in one particular instance a shop steward had been previously reported as claiming that if the employer did not comply with demands, "other methods would be used to force him." In such cases, the employer has little or no recourse other than to comply with demands, since a man has a right to quit a job if he so wishes. In the instance mentioned, the operators that quit were called upon individ-

ually in an effort to get the department back in operation. Some of these men had been with the company for quite a few years and had gained much in the way of seniority rights. However, one of the oldest employees, when asked to return to his job, replied, "I wouldn't dare to come back."

Still, of course, the union denies any responsibility for the actions of these members and refuses to take necessary steps to prevent a recurrence and to keep these vital war plants in operation.

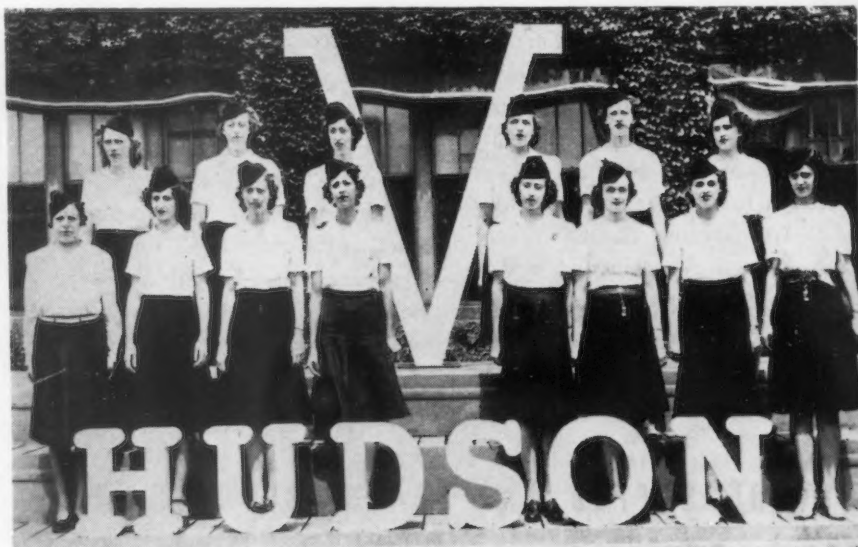
**I**N the meantime, three government agencies, the War Production Board, War Labor Board, and War Manpower Commission, requested freezing of wages, hiring, and firing, pending a labor-management conference of tool and die makers which is scheduled to be held here shortly. Press notices were the only indication to either labor or management that such a request had been made, but WPB officials stated that as soon as a definite date could be set for the meeting requests for attendance would be sent to the individual plants and unions. In the meantime, it was urged that the several hundred shops in the industry and the unions accept the newspaper publication as official notice and refrain from making changes in wages and working conditions.

While the meeting will be held in a matter of a very short time, the suggestion of freezing wages brought immediate and loud protests from the unions where it was claimed that even a temporary freeze would cause consternation and create dissension in every tool shop in Detroit.

J. J. Griffin, president of the Society of Tool and Die Craftsmen, an independent union, said "this is the first indication of the manufacturers playing into the hands of Hitler and will cause stoppages and strikes over which the unions would have no control." Just how Mr. Griffin's charges can be laid to the door of the manufacturer is rather obscure since it was agencies of the government and not the manufacturers that requested the conference and the freeze. The unions claimed that some 14,000 tool and die workers had been awaiting a decision by the WLB on wages and working conditions and it would be unjust to them to freeze rates when the equalization of wages promised by the board last February are so long overdue.

Even though the WPB and WLB promised that if the conference concurs with the plans, final judgment on the four cases now before the WLB would be rendered and wage decisions would be retroactive to August 11, this guarantee of fairness apparently was no incen-

**FAIR PATROL NOT WAAC's:** These uniformed young ladies are a part of the Hudson Motor Car Company's plant protection force. They have been sworn in as civilian auxiliary police and can make arrests.





Let 'em try to find aid or comfort here



P&W Photo—Unretouched

Fifteen — count 'em — fifteen staggered tooth milling cutters roll through high-precision production at Pratt & Whitney. Stacked on one arbor, they are getting a clean, sharp, uniform trim with the speed and certainty only a Pratt & Whitney cutter — mounted above — can deliver.

The day after this batch of cutters was finished — milled, hardened, ground, perfected to P&W's high standard of accuracy — they were on the job producing for Victory.

Let Hitler and his little yellow confederates try to get aid out of the knowledge that these P&W small tools, and thousands more daily, are swelling America's military might.

Let 'em try to get comfort out of our advice to P&W equipment users:

*Work your P&W tools 24 hours a day . . . don't spare the pressure . . . they can take it.*

**PRATT & WHITNEY**

Division Niles-Bement-Pond Company

West Hartford, Connecticut



tive for cooperation by the unions. The cases now pending involve suits by various UAW-CIO locals against General Motors, Ford, Chrysler, and the Automotive Tool and Die Manufacturers Association.

**C**HESTER A. CAHN, executive secretary of the tool and die association, speaking for about 180 member companies in his group, said that the companies were quite willing to abide by the freeze order pending the conference, but the Washington announcement without official notification was causing considerable disturbance in the industry.

The conference will necessarily confine its discussions to wage equalizations. One issue that is being pressed in the fight for stabilized wages on a higher scale for the tool and die makers is the differential in rates paid to the workers in "captive" and "independent" shops. The independent tool shop workers are getting about 20c. an hour more than those in the captive shops.

An upward bound in the number of illegal strikes in Michigan during July was noted, while the number of legal strikes and the number of men on strike decreased slightly. During the month, 27 strike notices were filed and the State Labor Mediation Board stated that it had knowledge of nine strikes occurring without formal notice being filed as required by the state laws. In June, there were 29 legal strikes but no illegal work stoppages.

The legal strikes during July involved 8584 persons, while 9473 were involved in the illegal walk-outs, a substantial reduction from the 25,460 persons that went on strike during June. Of the total number of plants closed by strikes during July, about 28 were factories working on war orders. The State Labor Mediation Board indicated that it had received 93 notices of labor disputes during the month and closed 79 cases.

**T**HE old fashioned "huskin' bee" has given way in the rural areas of Michigan to officially sponsored "scrap bees." With the Michigan scrap quota for the remainder of the year set at 1,100,000 long tons, or 6.5 per cent of the national quota, the General Salvage Division of WPB through the Michigan Salvage Committee has laid plans for the various county volunteer units



**SUGGESTION AWARD WINNERS:** Katherine Dowd (left) and Evelyn Toupet (center), two of 48 employees of Thomas A. Edison, Inc., West Orange, N. J., to receive awards for production suggestions. George Pfaust, of WPB, is shown congratulating them.

to solicit each and every farm in the state for this vital war material.

So far this year, more than 75,000 tons of scrap metal have been collected through these county agencies and directed into war industries, and during the past month through a special WPA campaign in 47 of the 83 Michigan counties, 4966 tons of scrap metal were netted.

Material shortages in the Detroit war plants continue to pop up like boils on the production surface. Numerous reports have been received that plants have shut down for short periods of time awaiting arrival of materials. One plant, originally set up for a seven-day week operating cycle, reduced operations to a six-day week, and now is contemplating the curtailment of operations to a five-day week because material is not forthcoming in sufficient quantities to maintain higher operations.

Declaring that material shortages are only temporary and that they can be eliminated, C. E. Wilson, president of General Motors Corp., suggested that Washington permit industry to take over the reins of production, stand on its own feet, work out its own problems, and meet the needs of the war program in this country. He suggested that if government requirements were carefully reviewed, lend-lease allocations trimmed sharply, and production restrictions eased, industry could and would capably meet the heavy demands placed upon it.

Manpower, according to Mr. Wilson, would be the point of shortage rather than materials if industry was permitted to work out this problem, and the manpower situation could be alleviated by longer work weeks.

**I**T was indicated this week that the bulk of the aircraft production of the Southern California plant of Vultee Aircraft, Inc., would be a new type of training plane constructed almost entirely of less critical materials. A newly developed process wherein thin sheet steel is welded to an expanded metal base will be used in the construction of this new type ship. This method of plane construction, developed by Vultee, has been tested, and models of the new training planes have undergone both strength and buoyancy examinations.

A quick check of the machine tool industry indicates that while incoming orders passed their peak about a month or so ago, production is still steadily on the upgrade. Currently, builders are being heckled with cancellations followed immediately by reinstatements of orders, and a general inability of purchasers to make up their minds as to whether or not they want orders now on the books to stand.

Recently, an order for a large, special type shear was cancelled and reinstated three times in one day. The shear, the order for which carried a special urgency rating, was finally delivered to another plant because the company placing the original order discovered that the tool was not needed until about Jan. 1, 1943.

This casual use of high preference ratings and urgency standings for machine tools, or for any war material for that matter, should be immediately eliminated as there are many plants that are losing production time because of the inability to obtain material, and many buyers have legitimate urgency ratings that cannot get the deliveries they need.

One bright spot in the machine tool field this week was the price cut made on vertical boring mills by the Fisher Body Corp. Fisher has been building these tools for a little more than a year, and when it was found that the cost of building these mills did not come up to original estimates, the price reduction was announced, retroactive.

# to help YOU

## *do a trouble-shooting job*

### in the production of Stainless Parts



#### **Adjust Press Speeds For MORE Output!**

Perhaps your press speeds are OK. Maybe an increase in press speed is needed. Or a quick checkup may even show that a reduction of 10 to 15% would increase output and conserve metals. Often, slower press speeds will overcome die galling that can spoil parts and interrupt production.

#### **Saved: 30,000 pounds of Stainless!**

From 45,000 lbs. of Stainless Sheet to only 15,000 lbs. of narrow Stainless Strip—for making the same number of aircraft parts! Saved: 30,000 lbs. of vital metal, and the time required to slit and handle the sheet. Check the use of narrow strip on your jobs where Sheet is used.



#### **How About Layouts?**

Keep skeleton scrap losses to an absolute minimum. Spend a few hours now to re-check layouts on jobs that are stamped from strip. The results will be well worthwhile.

#### **Check Your Rejects...**

Material that is not uniform throughout can cause many a headache such as wrinkling in the die. Then too, tearing and galling can also result from using off-size material. But whenever rejects are high, it will pay you to check all along the line.



THE CARPENTER STEEL COMPANY  
121 Bern Street Reading, Pa.



The Carpenter Stainless Slide Chart is a useful "assistant" to have at your elbow. It provides data on the welding, heat resisting and machining properties, etc. of each grade of Stainless Steel. A note on your company letterhead will bring you a Slide Chart—free to Stainless Steel users in the U. S. A.

# Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia



# Washington . . .

• **Truman committee investigating steel situation is seen lacking evidence to support some contentions . . . Committee could render service if it obtained accurate data on consumption and shipments.**



**W**ASHINGTON — Senator Harry S. Truman, Missouri, is convinced that the country's integrated steel companies are greatly responsible for the fact that there is no second front and also responsible for any steel shortage there may be.

On July 27, he broke into the remarks of Senator O'Mahoney of Wyoming, who had mentioned radio and press comment on a second front, to say:

"It is also interesting to note—and I call the attention of the Senator to the fact—that advertisements are being run now in the great metropolitan newspapers by various steel corporations, by the United States Steel Corp. and by the Bethlehem Steel Co., and others of the steel group, explaining very explicitly how they have expanded steel production. I think one of the reasons for this hurry in the effort to build public opinion on their side of the controversy is that on the 6th day of August the committee of which the Senate has made me chairman will go into the whole steel program and find out exactly why we are short and why it is necessary to shut off the shipbuilding program because of a shortage of steel."

On Aug. 10, after two days of the Truman "steel shortage" hearing had passed, the able Missouri delegate, revealed the true purpose of his inquisition. Senator Josh Lee,

Oklahoma, had remarked that though he had no definite proof he was of the opinion that there is an effort on the part of the big monopolistic interests—not only with respect to steel but with respect to rubber—to hold down production so that they can retain control over it after the war.

**S**ENATOR TRUMAN said: "The Senator said he did not have any definite proof of any monopolistic tendencies in connection with the fundamental metals which go to make up the necessities with which to fight this war. The record which was made by the special committee on the aluminum program and on the lead and zinc and copper program and the record which was made last Thursday and Friday show very definitely that there is a strangle monopolistic hold on these fundamental metals, and that certain interests are undoubtedly much more interested in what their position is going to be after the war than they are right now in furnishing the materials with which to win the war. I think we will very definitely prove that to be so before we conclude the hearings."

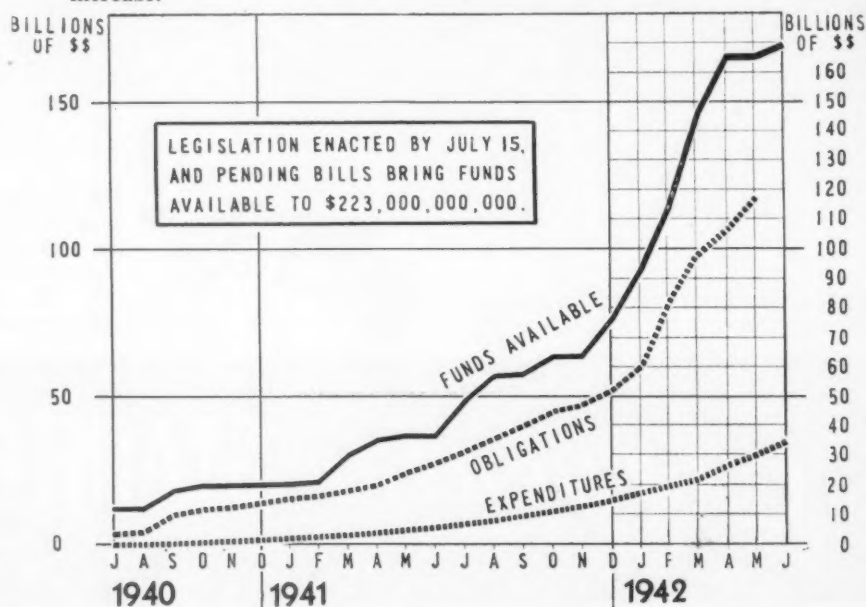
But there are those who disagree with Senator Truman's assumption that the record of the first three days of the steel committee hearing

shed any light on the steel shortage, if there is one. Nor is there any evidence in the testimony to show that United States Steel Corp., Republic Steel Corp., Inland Steel Co., Granite City Steel Corp., Bethlehem Steel Co., Carnegie-Illinois Steel Corp. and others are doing anything but trying to make twice as much steel as the Axis. Of course the downtrodden WPB came in for a licking on its inoperable priorities system which some officials say is largely responsible for an inflated demand for twice as much steel as present facilities can make. The WPB men could not account for the last gram of metal made.

**T**HERE were a lot of questions asked designed to show how the "big bad" steel companies dominated the WPB Iron and Steel Branch, were responsible for muffing the steel expansion program on the one hand and running away with it on the other. There was a lot of talk about oppression of the non-integrated steel company, but some of these witnesses spun the committee's attorney, Hugh A. Fulton, by complimenting the Carnegie-Illinois Steel Corp. on its fairness in sharing its sheet bar supply with the "little boys."

Charges were made that the "Morgan-United States Steel inter-

**FINANCIAL PROGRESS OF THE WAR:** This graphic analysis of the war's finances indicates that the total program has been extended to 223 billion dollars, of which 212 million dollars in contracts and authorizations has been allotted up to July 15. Actual expenditures for the war effort, ended June 30, amounted to \$34,765,000,000. In June expenditures amounted to \$4,123,000,000 as compared with \$3,880,000,000 in May, a substantial increase.







## "Can you protect port slopes from slag cutting?"

was the question asked  
a Basic Engineer

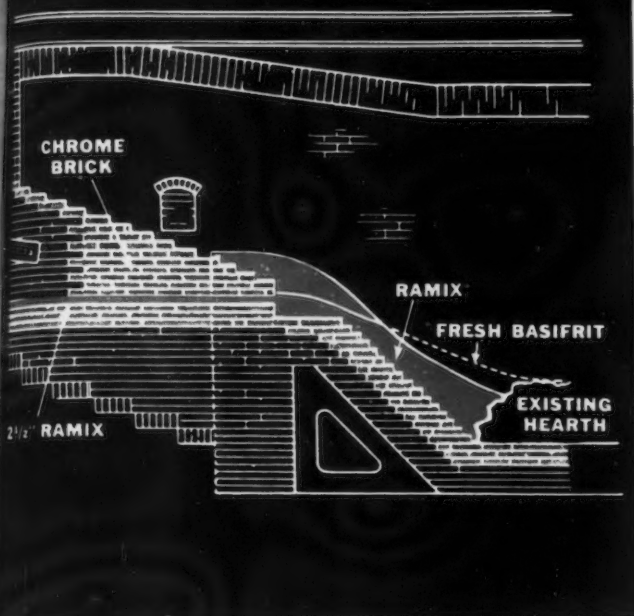
● "What's your recommendation to prevent this?" an open hearth superintendent asked.

Trouble was that slag was going through the joints in the brickwork of the ports of an open hearth furnace, cutting out the uptakes and dropping the arches over the slag pockets. When the Basic man called, both ends of the furnace had been torn out to remove steel and permit rebricking.

His many years' experience with modern open hearth refractories enabled this Basic Engineer, a veteran open hearth man himself, to make a suggestion: "Face the slopes with Ramix." The idea seemed sound to the superintendent. They tried it, and it worked.

Ramix was installed over the new brickwork of the slopes—12" thick at the uptakes, 6" thick at the junction with the fused hearth. It was well rammed to provide an even, properly-shaped contour. A 2½" layer of Ramix was carried back under the burner, between the burner wing walls. The first heat charged was a skull heat and developed the usual foamy slag. Slag washed up into the port slopes, cutting the sidewall brickwork, but the Ramix stood up. And today, after two years of severe wartime service, the Ramix slopes are still sound.

The service that Basic Engineers give is practical. It may help you get more production out of your furnaces. Think of these men as *your* Refractories Service Men and call on them whenever you have a refractory job to do.



Application of Ramix to port slopes of an open hearth, to protect brickwork from cutting by foamy slags. Note thin layer of Ramix carried back under burner.



Installing Ramix over port slope brickwork. With pneumatic hammer, refractory is easily and quickly rammed to desired contour. It airsets into a hard, dense monolith.

### BASIC REFRACTORIES FOR THE STEEL INDUSTRY

**MAGNEFER** — Dead-burned dolomite for hearth and slag line maintenance.

**SYNDOLAG** — Dead-burned, rice size dolomite for maintenance.

**BASIFRIT** — Quick-setting magnesia refractory for new construction, resurfacing and maintenance.

**OHIO MAGNESITE** — Domestic dead-burned high-magnesia grain refractory, equal to Austrian.

**695 PLASTIC** — Strong plastic basic refractory for hot and cold repairs.

**RAMIX** — An air-setting, time-saving basic refractory for rammed hearths and cold repairs in open hearth and electric furnaces.

**GUNMIX** — A basic refractory for maintenance of furnace walls, sized for use with a cement gun.

**HEARTH PATCH** — For deep hole patching and other quick repairs in the basic open hearth.

**RAW DOLOMITE** — Washed open hearth dolomite in rice size and standard ½-inch.

### BASIC HEARTH



REFRACTORIES

## BASIC REFRACTORIES INCORPORATED

FORMERLY BASIC DOLOMITE, INC.

CLEVELAND, OHIO

ests" had prevented the West Coast from having any steel facilities in the last 50 years. But no testimony was given to logically support these charges. When the Committee tried to show that Carnegie-Illinois Steel Corp. was impeding the war effort by shutting down its mill at Canonsburg, Pa., it failed because the testimony of James E. Lose, vice-president in charge of operations, Carnegie-Illinois Steel Corp., proved that there was no longer any market for the thin sheets made from Bessemer steel. For this was corroborated by Richard E. Sentner, head of the WPB Tin Plate Unit, who also said that in his opinion the shut-down was caused by reductions forced on steel companies by the Tin Conservation Order, M-81. Mr. Sentner also said that containers made from Bessemer steel were not suitable for certain food packs on account of the fact that these foods react with Bessemer sheet to produce hydrogen bulges, spoiling the food.

The fact that Republic and Bethlehem plants were deferred by WPB along with that of the Ford Motor Co. and others on the ground that the plants could not be finished by June 30, 1943, took the sting out of the accusation that big steel got

all of the advantage in the steel expansion program. But, it was brought out by W. H. Hauck, chief of planning unit, WPB Iron and Steel Branch, that expansion had been approved for some of the larger units because they financed their own construction at first, and because it was more economical to build additions to existing mills of some size because of the assured steel supply for construction, the proximity of their high grade coal supply for coking purposes, etc.

**A**RCHIE McFARLAND, president, Wheeling Steel Co., testified that some of his projected plant expansion had been deferred, but nowhere in his testimony is a word of criticism of "big steel" as the bogeyman. It is very likely that he added somewhat to the Committee's discomfiture when he was asked if he had any comments on the steel distribution system, when he said:

"I would not consider myself competent to pass on that. I imagine that the men who are trying to handle the distribution problem have plenty of troubles. They probably have calls from every direction, and I am sure that it would take quite a lot of time to work

out a system that would be entirely satisfactory to all involved, and while there might be some few things here and there that we would rather have the other way, 10 to 1 we might be wrong and they might be right after all."

Even the words of John F. Budke, vice president, Parkersburg Iron & Steel Co., Franklin, Pa., star witness for the committee must have hurt Senator Truman's belief in human nature when he said:

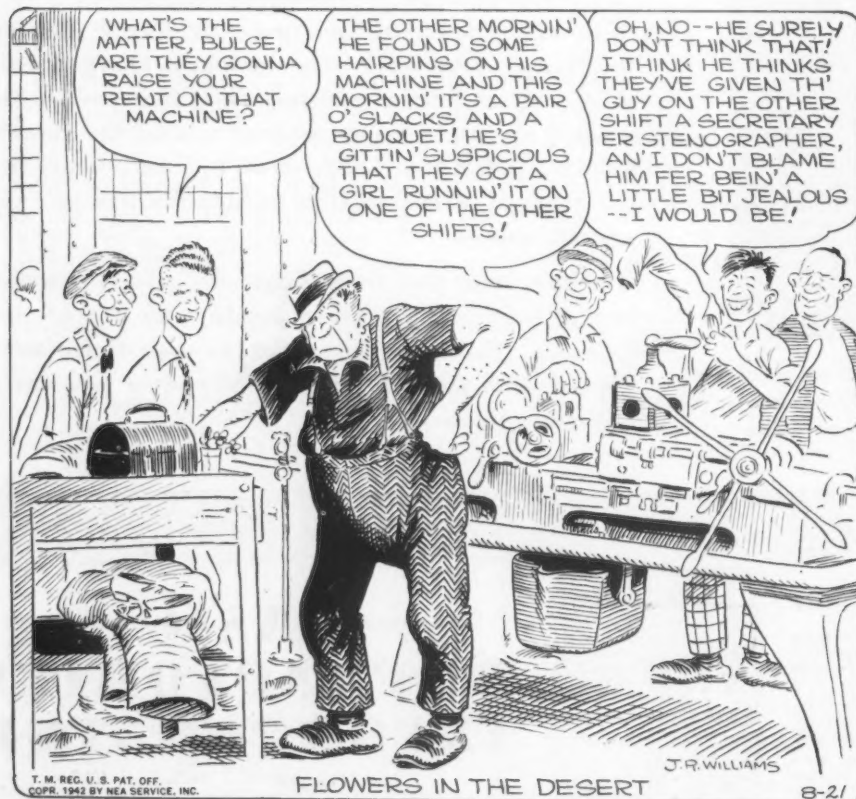
"It is assumed that the personnel for the administrative agencies would be procured by the government from the large steel companies known by it, particularly since procurement has to be rapid. It is not to be supposed that small and relatively obscure companies such as ours, should in the emergency be requested for personnel to serve the government. The urgency of the government's need for steel was transferred to its agency personnel. They in turn made every effort to procure steel in the quickest manner. It is but natural that they could request assistance from the companies with which they were formerly affiliated and from which they came, and it is, of course, only natural that those companies would be pleased to cooperate with them." The direction of some of Mr. Fulton's previous questions had been to the effect that WPB was purposely and conspiratorially dominated by the large companies.

**I**T is true, nevertheless, that Mr. Budke said that there was a monopoly in steel and said that because of the operation of the priorities system he could not get sheet bars and his mill with a capacity of 2500 tons a month had dropped to 410 tons in June. But John P. Hosack, vice president and treasurer of the Mahoning Valley Steel Co., another small non-integrated steel operator whose operations have been reduced, was very cordial in his opinion of Carnegie-Illinois. He said: "... We have had such fine treatment from Carnegie-Illinois, that we would prefer that they didn't get it from Carnegie-Illinois. That would put quite a burden on them." (Mr. Fulton had asked if it would be a help to Mahoning Valley if the government should attempt to distribute steel more evenly among the steel producers).

Mr. Fulton had evidently forgotten  
(CONCLUDED ON PAGE 120)

## THE BULL OF THE WOODS

BY J. R. WILLIAMS





irely  
and  
few  
ould  
D to  
they

ldke,  
ron  
wit-  
ave  
in

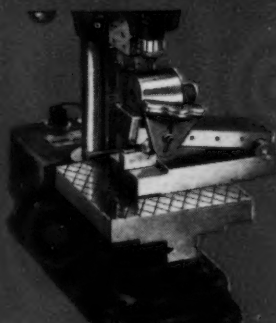
anel  
cies  
rn-  
ies  
ro-  
is  
and  
uch  
ncy  
ve  
of  
ras  
on-  
ort  
est  
ey  
he  
re  
ch  
ly  
d  
"  
l-  
n  
r-  
l-

.  
a  
t  
e  
t  
l  
c

.



3



4



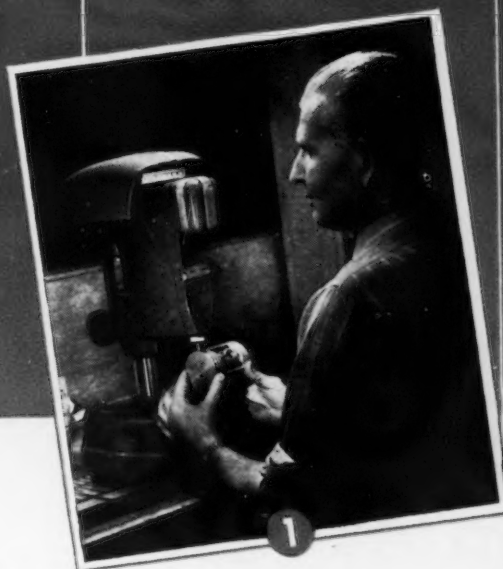
5



6



7



1



2



8

# ARE YOU GETTING *Maximum Service* FROM YOUR VISUAL GAGES?

**1** Equipped with plain and serrated anvil for the checking of width, thickness, height, or outside diameter.

**2** Equipped with flat anvil and thread wire attachment for checking pitch diameter of screw threads.

**3** Equipped with standard backstop for accurate and rapid positioning of work being gaged.

**4** Equipped with wide anvil and Sheffield sine bar fixture for the checking of tapers.

**5** Equipped with Sheffield Internalgauge for the checking of inside diameter, taper, and out-of-round.

**6** Equipped with wide anvil and V-block for checking outside diameter of cylinders and bushings.

**7** Equipped with fixture to check ball diameter of an inner ball race.

**8** Internalgauge with fixture to check a depth.

The Sheffield Visual Gage is used for many purposes. If you are not familiar with all of them, the outline here may suggest a means of increasing the effectiveness of your gages and the variety of work they do. Sheffield Visual Gages are used:

## *In the Inspection Department*

For the final inspection of close tolerance manufactured parts.

For the classification of such parts as the basis for selective assembly.

## *In the Tool Room*

To check fixed size gages for wear.

To check precision gage blocks for wear.

To check the dimensional accuracy of tools.

## *In the Production Shop*

To provide machine operators with an accurate check on work in process.

## *In the Receiving Department*

To check dimensional accuracy of purchased parts and sub-assemblies on arrival.

## *In the Laboratory*

To provide maximum accuracy for measurements of all kinds.



**THE SHEFFIELD CORPORATION**  
DAYTON, OHIO, U. S. A.



# WEST COAST..

• Western steel men not excited over Truman Committee "disclosures" . . . Scrap cost favorable over pig iron in Western steel making . . . No "black market" expected to be uncovered.



**L**OS ANGELES—Westerners who have loudly claimed that their big ideas have found little encouragement from government loan agencies have found a much more enthusiastic audience in the Truman Investigating Committee than they would among the folks back home.

Few steel men in the state of Washington, for instance, were as goggle eyed as the nation's capital at intimations before the Truman Committee that the only reason the Pacific Northwest had not become a steel capital was because development of local iron deposits had been blocked by the Morgan interests and the United States Steel Corp. That claim made front pages of the daily press all over the country, but not a single press association stopped to dig into the steel production and marketing history of the section of the country in question.

If such investigation had been made, it would have shown that the states of Oregon, Washington, Idaho and western Montana and Wyoming, optimistically considered as a possible market by would-be Northwest steel producers, together count for less than a third of the Pacific Coast steel market. The Coast market, in normal years less than 2,500,000 tons, is now bloated by heavy shipyard consumption of plates and shapes. Far from dominating production in the Northwest, United States Steel Corp. does

not even have a mill there. Columbia Steel Co., Steel Corporation subsidiary in the far West, maintains warehouses at Portland and Seattle, but even these warehouses have been severely restricted since this country entered the war.

The larger of the two steel producers in the area, both of whose mills are located at Seattle, is Bethlehem Steel Co. The Seattle mill, acquired by Bethlehem when it absorbed the Pacific Coast Steel Corp. in 1930, was a prodigy of locally owned steel industries during the last war but never fulfilled its early expectation. Although equipped to produce U. M. plates and medium structural shapes, items which some prophets regard as the lode stars to perpetual shipbuilding activities, this mill managed to make its bacon and beans between wars principally because it could supply substantial quantities of reinforcing steel for huge dams and reclamation projects nearby. In many years, with production hovering around 50 per cent of capacity, it was lucky if it made beans, and in just two, 1929 and 1937, did it approach capacity operation.

The other Seattle producer, Northwest Electric Steel Rolling

Mill, Inc., until recently confined its operations to melting scrap in a single electric furnace and rolling merchant and reinforcing bars.

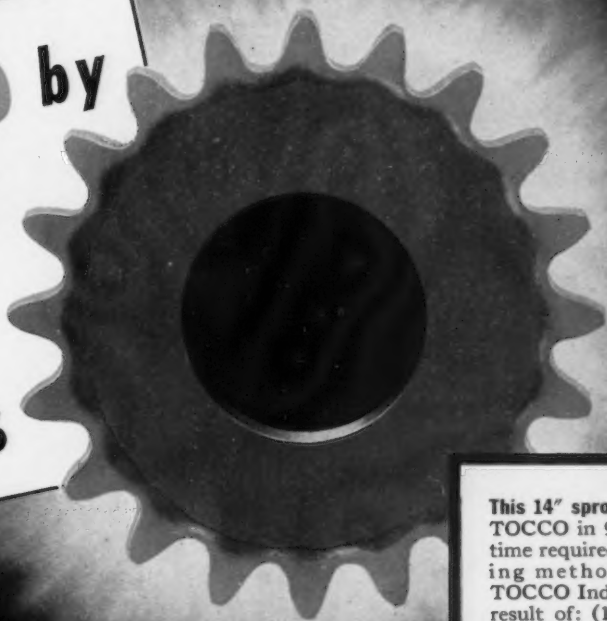
**T**HE significant factor in judging claims that the Federal government is overlooking a sure bet in not backing an iron industry based on the local ores of this region is the exclusive use of scrap by these two existing mills. Whether or not substantial suitable iron ore and coal deposits infest the Northwest, the secret of their lack of development probably lies in a normal price for scrap of \$10 a ton or less and a current ceiling price of \$14.50 per gross ton at Seattle. This favorable price combines with a more favorable supply situation than anywhere else on the Coast. Most estimates place the cost of producing pig iron in the Northwest at close to \$20 per ton, but some believe this can be shaved to about \$15. Under these circumstances it is understandable why both private and public money lenders might not regard even a whole mountain of iron ore as adequate security for a \$15,000,000 loan to build a steel mill. Such refusal, past and anticipated, was the core

**IT WILL FLY:** This light plane, pictured somewhere in the European war theatre, has earned the name "Grasshopper" because of its small size and small landing field requirements. When not practicable to fly to objectives, the plane is hauled as shown.

*U. S. Signal Corps Photo*

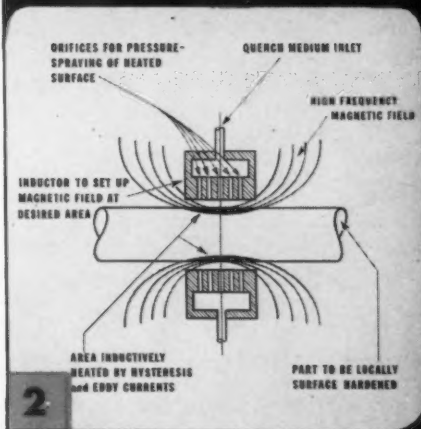


**HARDENED by  
TOCCO  
IN 90  
SECONDS**



**1**  
This 14" sprocket is hardened by TOCCO in 90 seconds—1/6 the time required by former hardening method. High speed of TOCCO Induction Hardening is result of: (1) almost instantaneous heating, (2) heating only the area desired to be hardened, (3) quenching without moving piece.

## How TOCCO increases output and improves the product



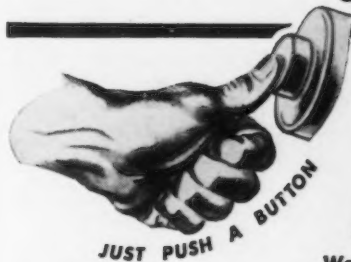
**How TOCCO works.** Inductor block with integral quench surrounds part or section to be hardened. Width and location of hardened areas are determined by design of holding fixture and inductor block. Depth of heating is determined by power input and heating time.

**TOCCO Hardening is completely automatic.** Controls pre-set. Push-button operation. Skilled operator not required. Rapid heating and quenching practically eliminates distortion. Improves working conditions because it is cool, clean, compact.

**TOCCO is being used extensively** for hardening armor-piercing shot and for other ordnance heat-treating work. TOCCO savings on one contract often pay for machine. Can be adapted to post-war products by simple change of work fixture.

Complete information in "The TOCCO Process" booklet. Free on request.

**THE OHIO CRANKSHAFT COMPANY  
CLEVELAND, OHIO**



# TOCCO

World's Fastest, Most Accurate Heat-Treating Process

**HARDENING  
ANNEALING  
BRAZING  
HEATING for  
forming and forging**



of charges before the Truman Committee that big interests were blocking a locally owned steel industry in the Pacific Northwest.

Charges before the committee intended to smear the War Production Board, Iron and Steel Branch centered around charges that the branch had erred when it tarried in approving the Kaiser iron and steel plant in southern California for lack of proof of suitable raw material. WPB Chief Donald M. Nelson went over the head of the Iron and Steel Branch to approve the Kaiser plant. The local background to this situation is that Kaiser did not and still does not, control the iron deposits of the Eagle Mountain, generally regarded as being the largest and richest in the neighborhood which at the time the Kaiser plant received approval were still being drilled by the Bureau of Mines to determine their worth. It has been generally overlooked that the Eagle Mountain deposits were controlled by other interests which, themselves, were negotiating with WPB Iron and Steel Branch for support of an RFC loan application for a steel plant, when Nelson personally approved the Kaiser proposal. Against claims of the Truman Committee counsel that Kaiser's plant should have been given immediate approval because he was taking all the risks are reports that the RFC mortgage for \$48,700,000

filed in San Bernardino County lists as security the plant property and buildings. Although the Kaiser organization has by dint of able management and diligent search rounded up sufficient materials with which to start to operate, it is possible to see how the Steel Branch pondered as to whether a magnificent reputation as a heavy contractor and shipbuilder was a better foundation for a steel plant than actual raw materials controlled by others.

As well as convincing doubters, the actual physical obstacles which Kaiser has had to overcome are not generally appreciated outside of California. The ore deposit which will support the plant is approximately 200 miles distant and several miles from the railroad. Sulphur content is relatively high. Sintering of approximately half of furnace requirements will probably be necessary. When this relatively small deposit is exhausted, Kaiser reportedly has as an ace in the hole an Arizona deposit 400 miles away of approximately 100,000,000 tons of low sulphur ore analyzing in the neighborhood of 30 per cent Fe. Coal which will be coked at the plant, must be hauled by rail from Utah, a distance of approximately 700 miles.

The problem of flux is complicated by the fact that the most likely local limestone deposits are being

held by cement companies. When Kaiser built the nation's largest cement plant in northern California he was not applauded by cement companies already operating there. Now, with the prospect that he will inaugurate a slag cement business in connection with his steel mill, he is not likely to find the southern California cement companies clamoring to provide limestone. Fortunately other, though not as favorable, sources may be available.

Cynicism in the industry notwithstanding, construction on the Kaiser plant is rolling along on schedule. Reports from Washington that application had been made to the RFC for a \$75,000,000 loan to expand the project with a structural mill and other facilities are not surprising. If these additional funds are granted, the total expenditure will mount to close to \$125,000,000.

**I**NDICATIONS are not apparent that a search by the WPB Compliance Branch for a "black market" in steel will be fruitful on the Pacific Coast. On the whole, despite some grumbling, compliance with WPB orders in this section has been excellent, particularly so in steel.

With the start of production last week by the Forge Division of the Earle M. Jorgensen Co. at Los Angeles, southern California last week had some badly needed additional forging capacity. Lack of forging facilities on the Coast has been one of the real problems faced by heavy industry. Now, shipbuilders say, the greatest boon to that industry locally would be the establishment of a large non-ferrous foundry to handle ship propellers and equipment.

The southern California plant of Vultee Aircraft, Inc., will be converted principally to the production of steel training planes, G. M. Williams, vice-chairman of the board of directors, announced last week. This is the first large scale use of steel for aircraft in this area.

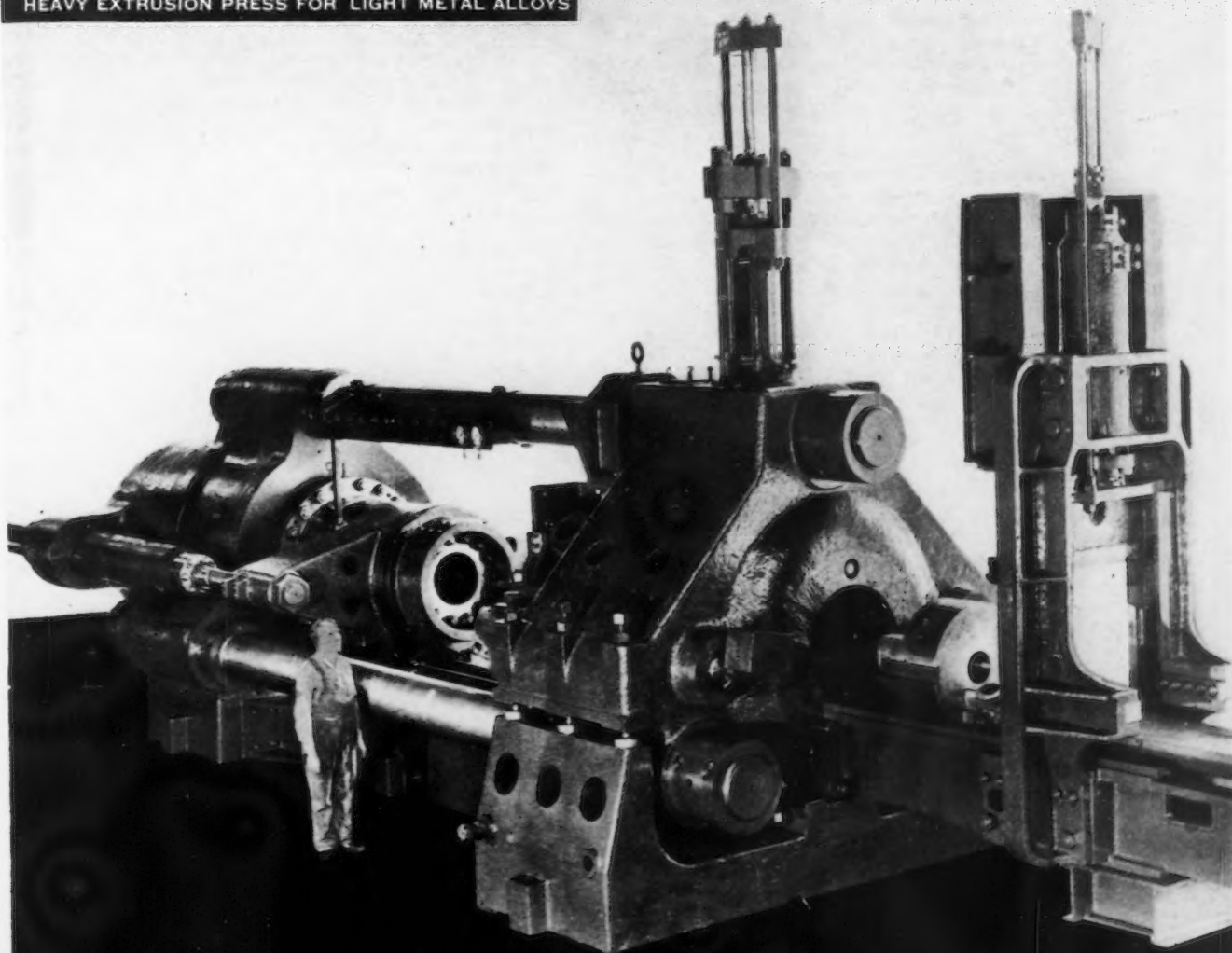
Tom Girdler, chairman of the board, Consolidated Aircraft Corp., San Diego, has entered the flying freighter controversy with the statement that "you can't carry today's freight to the fighting front in tomorrow's planes." Girdler says that Consolidated is prepared to do the job now with planes already in production.

**NOT FOR GOLF:** A ball that will not bounce has been found by Westinghouse engineers. Two balls of the same weight, one empty, the other filled partly with metallic powder, proved in the above test that the partly filled ball does not bounce. Note its straight trail on the steel plate versus the bounce pattern of the other.





HEAVY EXTRUSION PRESS FOR LIGHT METAL ALLOYS



# HYDROPRESS · INC.

ENGINEERS

CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS  
PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE

NEW YORK

N. Y.

# Fatigue Cracks

BY A. H. DIX

## Overmuch Flyspecking

• • • For a while we feared that the war effort would suffer from a lack of criticism of the adverse kind. Now we are afraid that it will be hurt by too much of it. At the moment it is fashionable to go over the war machine with microscope and hardness tester and loudly tsk-*tsk* whenever a flaw or soft spot is found.

This would be all to the good if the strong spots were greeted with equally audible hurrahs, but those whose words count most have assumed the inspector's what-is-wrong-with-this-picture role, rather than the umpire's impartial calling of balls and strikes.

If criticism were stifled one of Democracy's most useful weapons would be spiked. But a constant diet of criticism, constructive or otherwise, unleavened with intelligent and merited praise, gives nervous indigestion to even the ablest.

Perhaps it is salutary that the spotlight hover over the debit side of the ledger, but we think the credit side should merely be dimmed, not blacked out. And, lest the credits be lost sight of, let them be recited at frequent intervals, starting off with the reminder that we have been in the war business but a brief two years at the most.

In those two years the business has become the biggest thing on earth. Knock-knees and lack of muscular coordination are inherent in fast growth. If you had to take a small tool and die shop and expand it to General Motors stature in twenty-four months you would expect many creaks in the joints. You would expect to have to do much experimenting with men and methods before hitting the winning combination.

We are not pleading for more boasting. There is no dearth of that, but too much of it is unpalatable to the adult stomach and too frequently produces a result exactly opposite to that intended. What there is a need for is quiet, reasoned evaluation of the veritable miracles that have been accomplished in creating a huge fighting force and a great war goods producing machine in something less than a hundred weeks.

Let us have more of the intelligent kind of back-thumping, as for instance this thump, lifted from John H. Van Deventer's editorial of last week:

"... it is cause for congratulation, rather than chagrin, that our production plants have performed so marvelously as to go ahead of steel production. It would be much worse if we had a big surplus of steel over needs, for that would mean that we were not turning it into munitions fast enough."

## Super-Stopper

• • • Our candidate for the year's smartest headline is in the Ohio Seamless Tube Company's ad describing the use of that manufacturer's product in torpedo patrol boats. It is, "*Where the Flaying Fishes Ply.*" We bow to a master. That head is, in our opinion, a stroke of genius, and we would give anything within reason to know how it was evolved.

## Furnace Trouble

• • • A few months ago we reported as a stopper Armco's headline, "*Daniel's Fiery Furnace Was Just a Smolder,*" in an ad on the use of Armco stainless steels in aircraft engines.

I. A. J. Duff, of Woodside, Oakley Green, Windsor, Berks, England, objects:

I always understood that the furnace belonged to Nebuchadnezzar who gave a short lease of it to Shadrach, Mesach and Abednego, to the sound of harp, sackbut and other machine tools, and that the only interest Daniel had in the matter was that the press notices were issued in the "Book of the Prophet Daniel."

This is over our head. Our recollection of Daniel is limited to lions. We would like some Bob (Lindberg Engineering) Onan or some other furnace expert to referee it.

Mr. Duff also sneers at the garment Daniel wears in an illustration in the ad. He is wearing, according to Mr. D., a Greek chiton, which is an ankle length robe suspended from one shoulder. "That," he says, "is probably the reason he was put into the furnace, as it would be equivalent to our Winston Churchill putting on a pickelhaube."

Well, Bill (Armco) McFee?

## Keeper of the Bees

• • • Which reminds us to pass along this personal item Charley Baur, your favorite family journal's v.p. and g.m., picked up from the Altamont, Mo., *Times* via the *New York Sun*:

• • • Howard Beck is spending the summer in the Bill McFee home. He's helping Bill hive bees.

"Is this," he asks, "Bill (Armco) McFee?" Offhand we would say no. The Middletown McFee is a man of many talents but we doubt that apiology is among them.

## Prescience

• • • The folder in which we cage epistolary *rare aves* became too bulgy, so we went through it the other day and released its less rare inmates. While doing so we ran across a letter dated Apr. 2, 1941, which, in the light of later developments, has acquired added interest. It reads:

Your invoice for 1941 has just come to hand. After the second re-election of Franklin D. Roosevelt, the attitude in your leading articles has become openly hostile towards Germany and absolutely devoid of objectivity, so that we could not think of continuing to subscribe to your journal.

Heil Hitler!  
Ruhrstahl Aktiengesellschaft,  
Hattingen-Ruhr, Germany.

## Slag Shiner

• • • In a newspaper ad headed, "Puddlers Use Checking Accounts, Too," the Morris Plan Industrial Bank of New York City gives this definition of a puddler:

A "puddler" is a man who scrapes or shines the slag off the top of molten metal.

Would any puddler like to give a definition of a banker?

## Euphemist

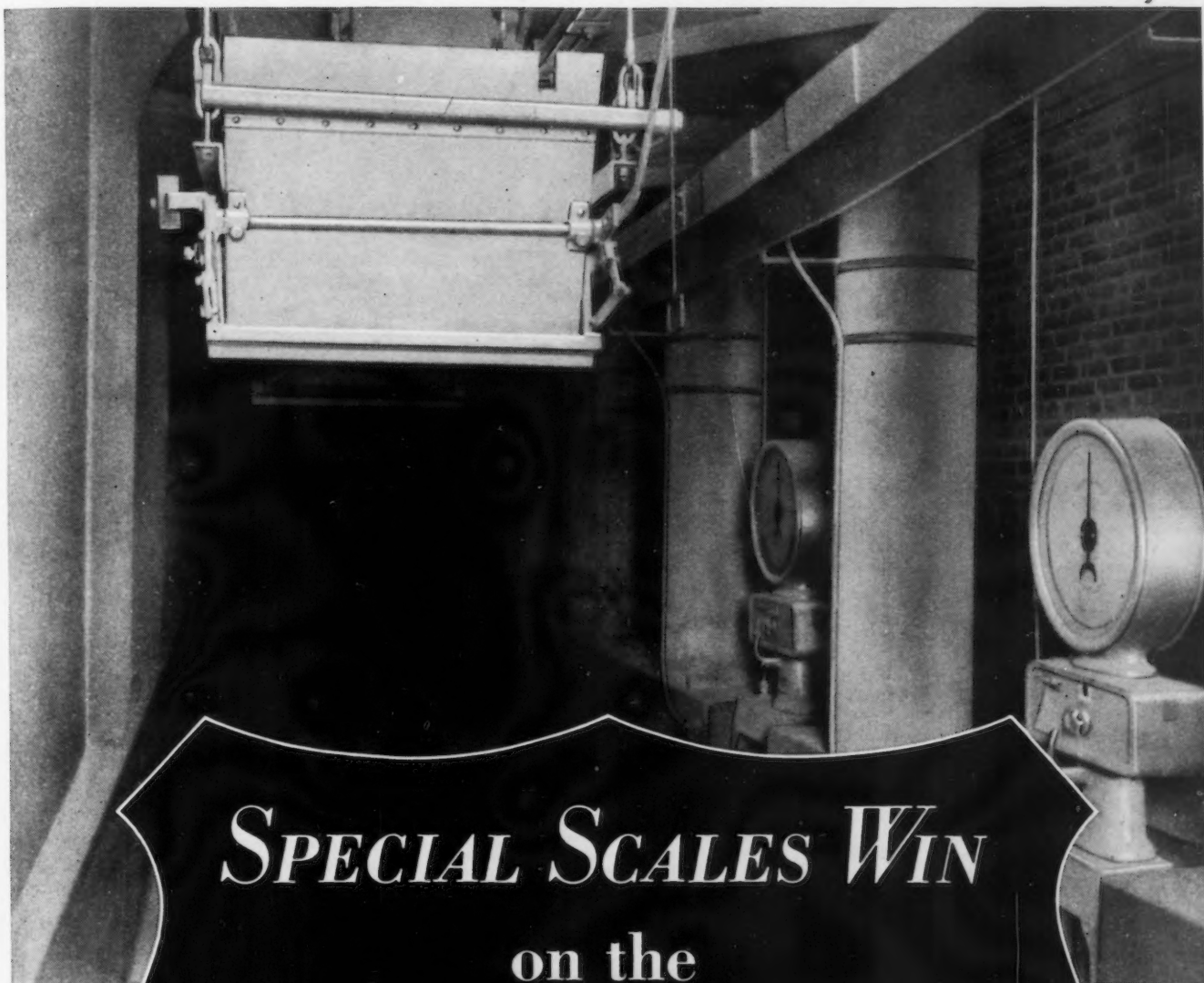
• • • Sam DeWolf, of our field staff, has been seeing quite a little lately of one of the Philadelphia gasoline rationing boards. Mr. Bernstein of that board told him that an application for additional rations came in the other day from a man who put himself down as a "resurfacing engineer." Mr. B. took it for granted that the applicant was a highway engineer who specialized in repaving jobs, but farther down in the application—in the part where it asks "Just what kind of work do you do?"—the answer was "I paint houses."

## Puzzles

So far just one answer to last week's problem has come in. G.M.R. makes it 11 minutes and 40 seconds. Whether or not this is right, we do not know, and are waiting to hear from more of the master minds.

Four minutes should do for this insult to your intellect:

There is an engineer at the front end and a conductor at the rear end of each of two trains, which are traveling in opposite directions. Each train travels at the rate of 45 miles per hour, and each is 66 yards long. How many seconds after the two engineers pass each other will the two conductors pass one another?



## *SPECIAL SCALES WIN* on the *PRODUCTION FRONT*

WHERE weighing or batching is required in war industries, special, ingeniously applied Fairbanks Scales speed production. In addition, through their accuracy, they often improve products or facilitate accounting.

This battery of 17 Fairbanks Hopper Scales speeds precise loading of charging cars. Auto-

matic shut-off at any preset weight can be provided.

Let Fairbanks engineers recommend, for purchase by means of your priority, the special or standard weighing equipment which will win . . . now and in years to come . . . on *your* production front. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

# **FAIRBANKS-MORSE**



**SCALES  
DIESELS  
MOTORS  
PUMPS**



# Dear Editor:

## SCREW MACHINE BOOKS

Sir:

It has been suggested to me by the Allied Screw Machine School of Chicago, that I write you in regard to books on Screw Machine Engineering. I am now working on Acme Gridley Model R. and R. A. and New Britain Gridley Model 60, using cemented carbide tools and doing extensive threading work.

AUDREY GOSSMAN,  
Fairfield, Ill.

• Otto W. Winter, president of the American Society of Tool Engineers, also chairman of the educational committee of the A.S.T.E., has a long list of publications on your subject. You can reach him c/o Republic Drill & Tool Co., Greene Street, Chicago.—Ed.

## ALUMINUM SALVAGE

Sir:

A few weeks ago, I read an article, describing the German practice of reclaiming aluminum alloy borings and turnings and making ingots which have equivalent properties of virgin metal. I would appreciate your advising me in what issue this article appeared.

E. G. WHITE,  
Plant Engineer,  
Crouse-Hinds Co.,  
Syracuse, N. Y.

• June 4, page 54.—Ed.

## CANS IN THE CANYONS

Sir:

All over the desert around Tucson one's horse has constantly to pick his way among piles of tin cans, old frying pans and broken thermos jugs. At all the arroyos, approaches to bridges and railway tracks the same situation exists. We need a nationwide drive, directed by an energetic individual for collecting this metallic refuse.

CLARA D. WEBSTER, M.D.,  
Tucson, Ariz.

• Perhaps WPB had better peer into these arroyos.—Ed.

## AIR CONDITIONED BLAST

Sir:

Your article on air-conditioned blast furnaces in the July 30 issue says that use of oxygen enriches blast speeds reactions in the furnace, and cuts down on the volume of inert nitrogen passing through the furnace. You claim that the mechanism of oxygen enrichment is still so expensive and complicated as to move adoption of this practice into the far future. Our company is prepared to offer this equipment to the steel industry and has submitted to it the thought time and again that the implications in the use of oxygen enriched air blast are so great that it

is certainly time for the steel industry to do something about it. We have, frankly, been stymied and suspect that perhaps some of our difficulties are due to the fact that the large oxygen manufacturers are extremely influential and do not want \$6.00 oxygen to appear in the steel industry that is now paying them \$73.20.

D. J. TONKONOGY,  
Industrial Gas Equipment Co.,  
Philadelphia

## "ELEKTRON"

Sir:

I congratulate you on the setup of the article in the July 23 issue on "Dry Machining of Magnesium Alloys." I was surprised, however, to see your reference to me as of F. A. Hughes & Co., Ltd., England. I am only nominally a member of the staff of F. A. Hughes & Co., as I have been transferred to Basic Magnesium, Cleveland. Also you refer to "Elektron" spelled with a "c" instead of a "k." "Elektron" is the registered trademark of F. A. Hughes & Co. and its associated company, Magnesium Elektron, Ltd., England, a partner of Basic Magnesium, Inc.

H. MILLS CARNER,  
Technical Asst. to President,  
Basic Magnesium, Inc.,  
Cleveland

## STAINLESS

Sir:

We notice in the July 30 issue of IRON AGE, page 62B, an article, "Discredit Film Theory for Stainless Steel."

We should like to know more about this process. Can you advise us where we may obtain a copy of the paper presented before the Electrochemical Society?

E. R. BOND,  
Aircraft Parts Division,  
Textile Specialty Co.,  
Greensboro, N. C.

• You can get a copy from Electrochemical Society, Columbia University, New York.—Ed.

Sir:

We are interested in securing the names of all manufacturers in the country making stainless steel clad sheet.

H. W. DODSON,  
United Steel Barrel Co.,  
Philadelphia

• Ingersoll Steel & Disc. Div., Borg-Warner Corp., Strauss Bldg., Chicago; Lukens Steel Co., Coatesville, Pa.; Jessop Steel Co., Washington, Pa.; Allegheny-Ludlum Steel Co., Pittsburgh. Joseph T. Ryerson & Son, Inc., distributes stainless steel clad sheets.—Ed.

## TOOL LIFE

Sir:

We would appreciate your permitting us to receive the booklet, "How to Increase Cutting Tool Life."

FLORINE GOSS,  
Reo Motors, Inc.,  
Lansing, Mich.

• The demand for this 24-page reprint of articles on tool steel conservation exhausted our supply within a week. A new and larger edition is on the press. This new booklet, entitled, "How to Save Tool Steel," totaling about 52 pages, will be ready within a few days. Price 35c. in stamps or coin.—Ed.

## PRECISION CASTING

Sir:

Is there any more literature available on precision casting? Also, has this process been released for general use?

J. H. RADCLIFFE,  
Engineering Department,  
Genelco, Ltd.,  
Peterborough, Ontario

• So far as we know, there are no data on precision castings other than what appeared in our July 9 issue. The New Method Casting Co. holds the rights to this process, 12 West 21 Street, New York.—Ed.

## EDITORIALS

Sir:

Some time ago, you ran an editorial by Mr. Van Deventer "The Town is Full of Strangers." I wonder if you could send me a copy.

GEORGE ASHBEY,  
Nicholson File Co.,  
Providence

Sir:

I would appreciate an additional copy of your editorial, "Slogans."

W. H. RIECKES,  
Secretary and Treasurer,  
Detroit Stoker Co.,  
Monroe, Mich.

## LATHE ATTACHMENT

Sir:

Would appreciate a list of the manufacturers producing a form turning attachment for lathes similar to the Keller, other than the Detroit Universal and the Turchan Follower.

H. R. WINTERHOFF,  
Winterhoff Machinery Co.,  
Detroit

• Sorry, we don't know of any but the two you mention.—Ed.

## DIP

Sir:

Will you please give us further information regarding the phosphoric acid dip treatment for rust prevention mentioned in THE IRON AGE of May 28.

J. W. GEDDES,  
Plant Supt.,  
H. K. Porter, Inc.,  
Everett, Mass.

• You can secure this data from Parker Rustproof Co., Detroit.—Ed.



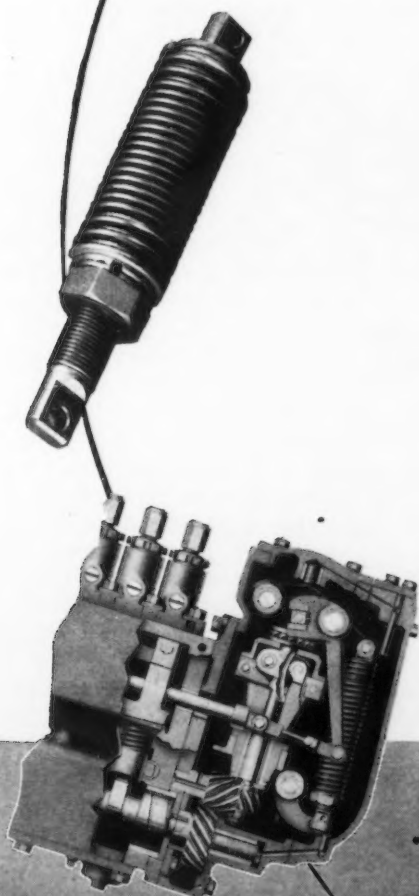
"CATERPILLAR" AND MUEHLHAUSEN SPRINGS

## Can Take It!

On the job 24 hours every day—"Caterpillar" built tractors are making minutes out of hours on hundreds of war jobs—uprooting huge stumps, plowing through mud, shoving boulders and earth, and then a stretch of "easy going" on dry ground.

Such service demands *instant, accurate* governor control of engine speeds. Sealed within the governor unit, shown at lower left, is one of the many springs Muehlhausen makes for "Caterpillar." It is accurate to a fraction of an ounce, capable of withstanding heat and corrosion. Upon its performance depends the rapidity with which the "Caterpillar" engine responds to suddenly applied loads, and the careful regulation under varying loads. This precision and dependability are the results of close collaboration between Muehlhausen and customer engineers.

Muehlhausen can do the same for you, with springs of every type — compression, extension, torsion or flat — hot or cold formed. For quick action, wire or write today! MUEHLHAUSEN SPRING CORPORATION, 817 Michigan Ave., Logansport, Indiana.



### FREE! TWO NEW FOLDERS

- New Die Spring Bulletin illustrates, describes 206 sizes and types of die springs.
- New Armament Bulletin shows importance of springs for many types of war equipment.





# This Industrial Week . . .

- **Troubles Mount But Output Grows**
- **Mills Report Quota System is Working**
- **Army Asks For "Kill The Enemy" Steel**
- **New Appeals Plan Ready For M, L Orders**
- **Ingot Production Declines to 96 Per Cent**

WHILE much of American industry continued this week to suffer from "prio ritis," a disease starting with dizziness and ending with the shakes, war materiel and weapons are being produced in quantities which seemed impossible six months ago.

Production of steel continues to move to higher levels and the uproar over inefficiency in the way it is being distributed to U. S. war plants does not hide the fact that the American war machine is growing into something bigger than the world has yet seen.

Few days pass in which the performance of certain segments of U. S. industry, with relation to the war program is not characterized as less than adequate. Sandwiched into the facts and opinion about how poorly industry is doing is bright news which says industry's accomplishments will bring an early end to the war. It is this quick shift from bad to good news and back again that gives industrial and other classes of readers the shakes and shivers.

This week, like most, had its share of bright news. From steel manufacturing centers comes word that the recently adopted quota system for production of steel is working out. So far the quota plan seems to be enabling the mills to set up a schedule for each product and go ahead without too many product changes, within the framework of the priority system. Better balance of raw steel distribution and mill operation is said to be resulting. Yet the actual distribution of steel is governed by the priority regulations, and if ratings are not judiciously granted there are bound to be bottlenecks because of "first" things not coming first.

SOME steel producers believe that the quota system itself may bring to light mistakes in order priority ratings and for the time being believe that in the quota system's flexibility there is promise.

News about the priority rating setup in the last few days has not been good, and industries which have "prio ritis" in its advanced stages report that visits to Washington to straighten out inequalities in PRP ratings are probably reaching a new high.

In many plants this question of ratings is not academic; it is a matter of life or death. To many war work plants the present jam over the super-ratings is compared to the most confused periods in the early days of the war. Present plans of the War Production Board for bettering steel distribution run along the

line of cutting up the steel supply as one might cut a pie, and rationing it to various users.

Meanwhile speculation over the steel shortage is confused because it appears there is a demand for 10 million tons of finished steel monthly whereas supply stands at 5.3 million tons. It is pointed out that this demand represents, to a great degree, cumulative orders and is so inflated that no exact figure is available to show what the true demand is. WPB steelmen say that the problem of steel distribution can be solved only by attempting to use available supplies of metal instead of trying to get next year's production on the mills this year.

ONE difficulty seems to be that the armed services have no program for coordinating purchases and consequently, sometimes finds ships, planes, tanks, and guns complete except for scarce items. Yet here, too, progress is being made. The groaning workings of the priority system reflect the movement of items for invasion as the U. S. goes on the offensive. Since everybody and his sub-contractor has obtained the new high ratings, and with raw materials in some cases inadequate to meet demands of war plants in operation and under construction, the Army and Navy are taking a strong hand in the confusion over priorities.

Army and Navy representatives visiting steel plants this week told steel executives that orders for steel to "kill the enemy" should be filled before orders to be used in building new plants in this country or developing new landing fields, warehouse and other such projects. Steel "to kill the enemy," THE IRON AGE is told, includes metal that will go into construction of trucks to be shipped to the various battlefronts and, of course, into all types of armament and ordnance materials for use in the fighting areas. However, this does not change the manner of shipment of steel companies on the basis of ratings. This step by the Army and Navy is expected to go far in preventing as far as possible tie-ups of those plants most vital to the war effort.

SOME machine tool builders have notified their customers of new delivery schedules. It is revealed that some machine tool producers are taking over direct war work. District Army procurement offices have

been told not to cancel any outstanding orders for machine tools without approval from Washington.

A WPB decision to curtail production of reinforcing bars is believed to have been somewhat premature since the Army and Navy are pressing for tonnages of these items to build up their emergency supplies.

Army and Navy specifications for alloy steel are undergoing revision by the trial and error method. Specifications developed by years of research are being deprived of substantial amounts of critical alloying metals but the results, it is claimed, are satisfactory. Previous ideas of the need of alloys for armor plate for various purposes are being revised with the sole test today being whether or not the plate meets ballistic tests.

**I**N Washington it is reported that Lend-Lease requirements are now consuming about 15 per cent of steel supply on an annual basis, a percentage that is subject to overnight change in the war situation.

Progress is being reported in the "battle of the forms" in which Joseph I. Lubin, chairman, and the members of the WPB committee for the review of data requests from industry, are seeking to dry up the flood of forms which has provided one of the major wartime headaches to the metalworking industry. All new forms and reprints of old forms have been squeezed down in size so that they can be used in a standard carriage typewriter. Mr. Lubin reports that steps have been taken to eliminate "bootleg" or unauthorized data requests to industry, including those sent out by telegraph.

At the same time, it is announced that a new method for handling appeals from the M and L priority orders is soon to be adopted by the WPB. Instead of having appeals made to the War Production Board in letter form, the WPB Bureau of Priorities, in a laudable move toward decentralization, is setting up a plan to have pleas for relief made to the WPB field offices where the company complaining may get more sympathetic treatment from persons more familiar with his business and his problems.

**T**HIS week some thousands of tons of iron and steel, welcome in a priority-unbalanced market, were being channeled into war use by the WPB distressed stock (steel) unit. This unit, holding jurisdiction, where the frozen inventory in the hands of the processor is more than five tons of carbon steel or one ton of alloy steel, is functioning to bring buyer and seller of the frozen inventories together.

Meanwhile the WPB's compliance branch has made a report on its inquiry into the possible "black market," which officials of Higgins Industries, Inc., charged exist in steel. The branch's conclusions are that:

"1—No evidence was developed to show directly that steel products had been shipped to the Higgins company in violation of the WPB orders.

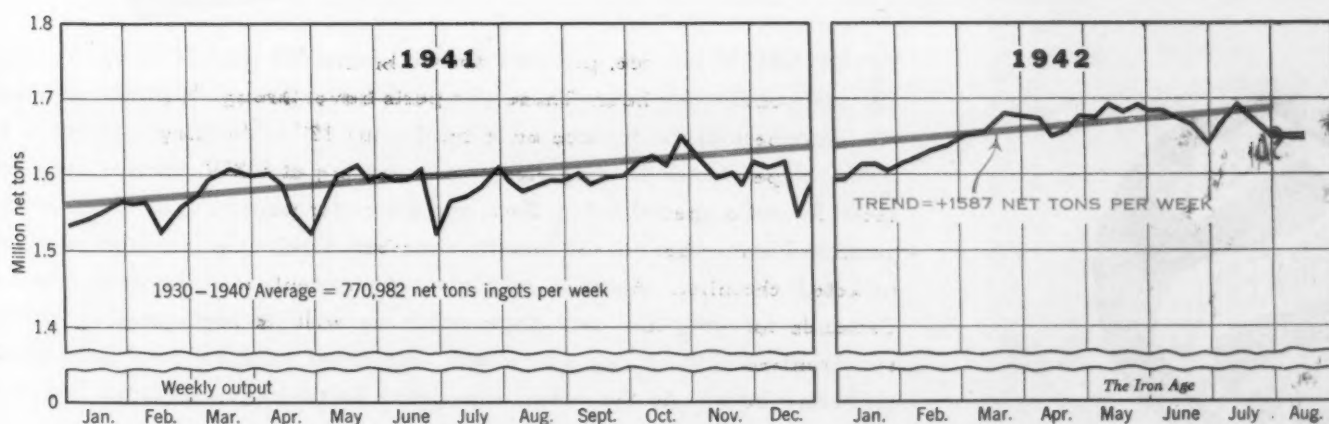
"2—There is evidence to indicate that some steel warehouses, in addition to the 22 penalized last spring in other cases, may have violated WPB quota regulations."

**T**HIS week steel ingot production in the U. S. was down slightly to 96 per cent from 96.6 last week, although output in the important Pittsburgh district was up a point to 97 per cent and the big Chicago area gained a point to 102 per cent. Operations at Cleveland, however, declined five points to 95 per cent, partly because of repairs. St. Louis is off to 92 per cent of capacity, from the 111 per cent schedule last week, while Detroit is a point lower at 100 per cent and the eastern district is down seven points to 82.

Developments at Washington suggest that government officials will finally accept the experience and knowledge of scrap men in overcoming the scrap shortage. Formation of Waste Materials, Inc., (subsidiary

*See page 126 for more information about Waste Materials, Inc.*

of Metals Reserve Corp.), to buy up and re-sell at least 5 million tons of scrap, mostly from uneconomic sources, which is not obtainable under present OPA price ceilings, has just been announced.



**Steel Ingot Production  
by Districts,  
Per Cent of Capacity**

	Pitts- burgh	Chi- cago	Youngs- town	Phila- delphia	Cleve- land	Buf- falo	Wheel- ing	South	De- troit	S.Ohio River	West	St. Louis	East	Aggre- gate
Week of August 13.	96.0	101.0	98.0	87.0	102.0	104.5	86.0	94.8	101.3	105.0	102.0	111.0	90.0	96.6
Week of August 20.	97.0	102.0	98.0	87.0	95.0	104.5	86.0	93.6	100.2	100.0	102.0	92.0	82.3	96.0





## *A Sure-Fire Method of Brazing* **AT MAXIMUM SPEED**

**T**HE SALEM furnace, pictured above, brazes 300 pounds of small size gun components per hour. These gun parts travel through heating and cooling chambers of the furnace on a continuous 12" wide alloy steel mesh belt. Ribbon type electric heating elements, operating at 40KW, provide the heat at 2000° F. and a special Salem Seco gas generator permits at all times accurate control of atmosphere in the heating chamber. Cooling is provided by a water jacketed chamber. As with all Salem equipment, it accurately meets the demands for long life, and dependable as well as high-speed production, synchronized into factory operations. Whatever may be your heat treating problem, benefit by the broad experience Salem engineers have had in this country, Canada and Europe. Give them your problem now. Write today.



**SALEM ENGINEERING CO. • SALEM, OHIO**

	Page
Our Steel Output vs. Japan's...	88
Pix for Machine Operators .....	104
Knox Slaps Bayonne Strikers.....	111
Relief on M, L Orders .....	113

• • •

# News of Industry

	Page
Beehive Producers Aided .....	115
Priorities and Prices .....	117
Black Market Not So Black.....	118
Copper Faces Labor Problem.....	124

• • •

## Plant Shut-downs Seem Inevitable Unless Priority Relief Is Granted; Inventories Unbalanced

### Cleveland

• • • A spot check of representative Ohio concerns connected with the nation's war effort reveals that inventories are so irregular that plant shut-downs seem inevitable by early September, unless these companies are granted priority relief that will assure them of securing the necessary steel and other materials they need. Most of them blamed their predicament on the constant changing and "up-grading" of priorities, the PRP set-up, and poor distribution of the available materials to the most essential and needy plants.

One machine tool producer reports that it is entirely out of large-size carbon bars, although its inventory on other items is as high as three months with the over-all tonnage average working out to about six weeks. Lack of the carbon bars had so badly unbalanced production that the company had decided to give all its employees a vacation within one month, thus reducing its operations to two 10-hour shifts daily, instead of the previous 168-hour weekly schedule. Under PRP, the company will get an AA-1 on 15 per cent of its needs, an AA-2 on another 15 per cent, and

AA-3 on 10 per cent and AA-4 on another 10 per cent, and an A-1-a on 50 per cent of its requirements. This means that it will only be able to get a small fraction of large carbon bar requirements, with the probability that plant operations will have to be greatly curtailed. Meanwhile, the company is buying whatever steel it can secure and cutting it up to its proper size, regardless of the waste or cost.

Another machine tool producer only has a 30-day inventory, and would be in a bad fix if some expected steel deliveries are not made over the next few weeks. The com-

**MAINTENANCE MEN GRADUATE:** First class of 30 non-commissioned Army Ordnance Officers, under the command of Lt. J. L. Rhynard, right foreground, leaving GMC War Vehicle Training School, Detroit, after completing intensive two weeks' course.





pany is shopping the warehouses and "frozen" inventory lists to get whatever it can use. A third machine tool builder located in an isolated area has purchasing agents on the road to seek out and buy up steel wherever it can be found, and by this means has been able to

assure itself of a comfortable inventory position thus far.

An important manufacturer of welding rods and welding equipment has less than 10-days supply of welding rod wire. The company has not received its PRP ruling yet, and recently had an A-1-a rating for its rod wire and has applied

for a higher rating. The concern has been given an AA-1 and AA-2 for its welding machines, and inventories for this portion of its output is close to 30 days. Yet, there are many danger spots looming such as brass rod, small low-carbon bar steel, and other items, in spite of the fact that the concern has been allocated to turn out some three to four months' output by the Government for various war uses.

An important steel fabricator which had already been allocated about 200 tons of steel plate by the WPB for July and August, and during July had had delivery of about 100 tons of plate which it had been allocated in June, learned that under PRP it would only be allowed to accept delivery of a little more than 100 tons of plate for the entire third quarter. The company is fabricating an installation in connection with a new magnesium plant, and it will not be able to complete the installation entirely due to lack of sufficient steel, so that his efforts in this connection will be as useless as if the unit were not to be built at all. In a similar manner, the company will be able to complete only five out of six units required by a plant preparing to manufacture steel shell casings, because it will not be able to accept delivery of especially built material which has been completed and is ready for shipment by its supplier. In addition, the company is currently being denied the right to secure enough oxygen to operate its acetylene torches during the entire third quarter, and the allocation thus far points to two weeks of enforced idleness. The concern has appealed for revisions of PRP's stand in all cases, but at the last check had received no relief.

A builder of capital equipment unable to maintain a general inventory because of the specialized nature of its work expects to be faced with delays in completing important contracts because of the materials confusion. Its customers are currently scrambling to get higher ratings than the A-1-a's they had when the new AA rating series went into effect, and only the degree of success in their efforts will aid the company in maintaining full operations. Only a few days ago the company was notified by Washington that it would have an A-1-a rating for 85 per cent of its requirements and an A-1-c rating for 15

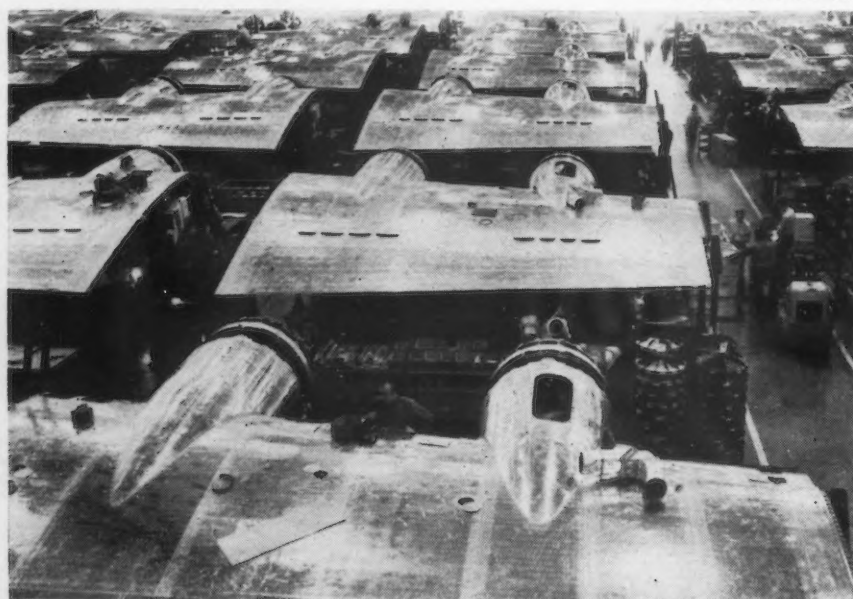
**FLYING FORTRESS FUSELAGES:** Main fuselage sections of flying fortresses are fitted out in this part of the Boeing Aircraft plant. Giant cranes next take the fuselages to where wings, tail, engines and armament are added.

*Press Assoc. Inc. Photo*



**HEADED FOR JAPAN:** These inboard wing sections of Boeing flying fortresses are on the wing installation line. Here motors and many other items are added before assembly to the fuselage. These wings and thousands more may soon be headed for Japan with a real greeting for Hiro.

*Press Assoc. Inc. Photo*



per cent. Neither rating is good enough to enable the company to secure structural shapes or plates, on which an AA-2 rating is necessary to assure delivery. Yet, structural shapes and plates are its most important raw materials. The company now has 3500 orders out to suppliers and will have to notify each of its new ratings, if and when it secures ratings high enough to get the materials it needs.

A manufacturer of nuts, bolts and rivets expects to have his tonnage requirements arbitrarily cut by 10 to 15 per cent and this reduction will be made up by reducing the working hours of his staff. The company has a one-month inventory of most items, but is low on high-carbon steel. It has had some cancellations of orders for truck and tank bolts and nuts, and most of the orders now on its books are still A-1-a.

Those companies which were satisfied with their allotments under PRP, apparently had gone to Washington and secured adjustments where necessary. On the other hand, the failure to receive high enough priorities has driven a larger number of plants to the warehouses and to the lists of frozen inventories in attempts to get the materials they know that mills can supply them on low ratings, such as A-1-a.

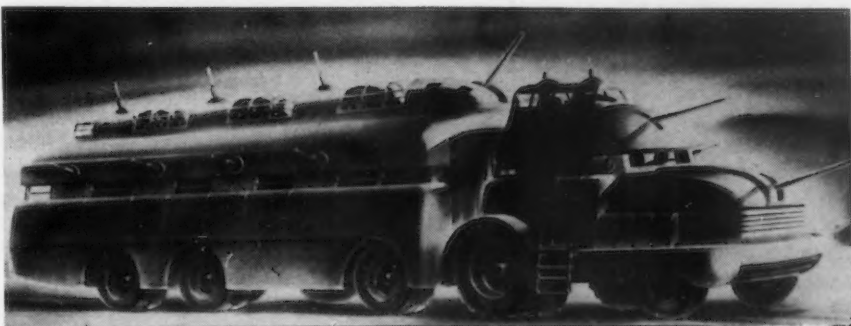
### 1100 New England Firms Can Do War Work, Survey Shows

Boston

••• According to a survey by McKinsey & Co., management consultants, 1100 New England manufacturing firms with a peacetime business volume of \$1,650,000,000, can be immediately converted to war production. These 1100 represent about 40 per cent of the 2900 New England small manufacturers whose individual peacetime business ranged from \$250,000 to \$2,500,000. The company's survey says that subcontractors "have sold the use of their facilities visually, not statistically, with ingenuity, flexibility, and imagination stressed."

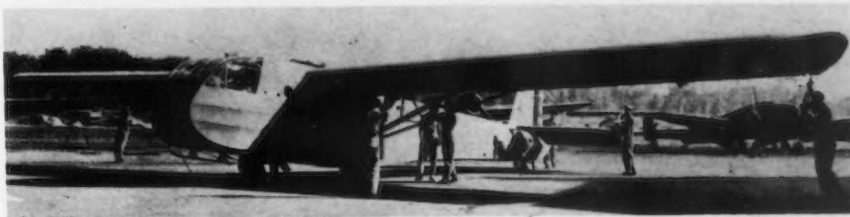
### 353 War Firms Aided

••• The Bureau of Finance reports assisting 353 war production firms in obtaining working capital during July as compared with 397 cases in June. Total financing in July was \$61,263,329 as compared with over 62-million in June.



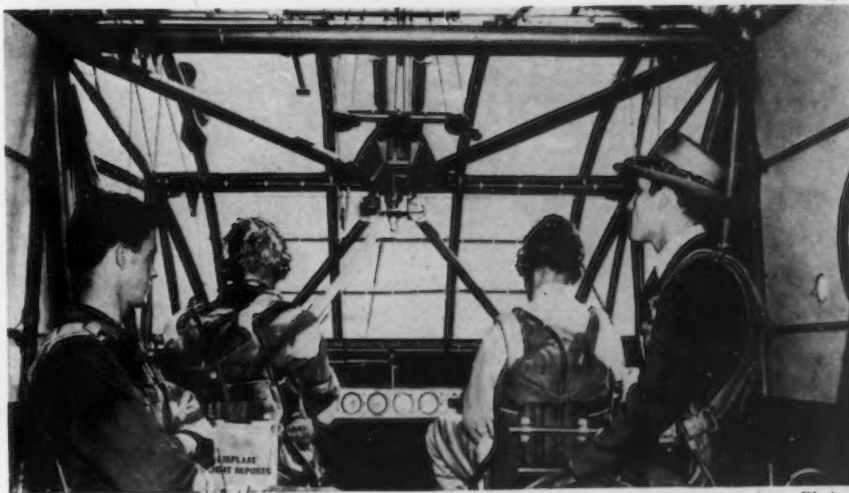
Wide-World Photo

**SUPER-ARMAMENT:** Still on the drafting boards are these two designs for "forts on wheels," by George W. Walker of Detroit. (Top) is described as a troop transport with cannon and anti-aircraft guns. (Lower) is a six wheeled tank also reflecting the super-streamlining.



Wide-World Photo

**COMMANDO GLIDER:** The new 15-place glider, now in mass production for the Army Air Force, will serve as a troop carrier and may soon put our Commandos on silent wings.



Acme Photo

**GAGES, NO MOTOR:** The Army Air Force's new Commando glider viewed from the interior shows the pilot and co-pilot surrounded by part of the usual array of instruments . . . but no motor. Note spacious dimensions for troop carrying.



## U. S. Monthly Steel Output Equals Japan's Yearly Rate

• • • American steel plants are now producing about as much steel every month as the steel industry of Japan can turn out in a whole year, the American Iron and Steel Institute has estimated.

For more than a year the total tonnage of steel ingots produced in the United States has averaged about 7,000,000 tons per month, and in some months has approached 7,400,000 tons.

By comparison, the best available reports of steel production in Japan indicate that the aggregate capacity of all the steel plants in Japan proper, occupied China, and Manchukuo is in the neighborhood of 7,200,000 tons per year.

Total steel capacity of the United

Nations is estimated to be nearly 131,000,000 tons per year, more than twice the capacity of all steel plants in Axis Europe and Japan.

Study of the available statistics on Japan indicates that a very substantial portion of certain major steelmaking raw materials must be imported into Japan by water.

Japanese iron and steel plants probably can obtain 100 per cent of their requirements of coal and limestone from mines within Japan proper. There is apparently a great insufficiency in the annual Japanese production of other strategic materials like iron ore, manganese, chromium and nickel.

Only tungsten of all the major alloying elements is available in Japan and Korea in sufficient quantities to meet the estimated needs of Japan's steel plants. Un-

doubtedly, however, Japan had accumulated before the war began large reserve stocks of the alloying metals which must be imported.

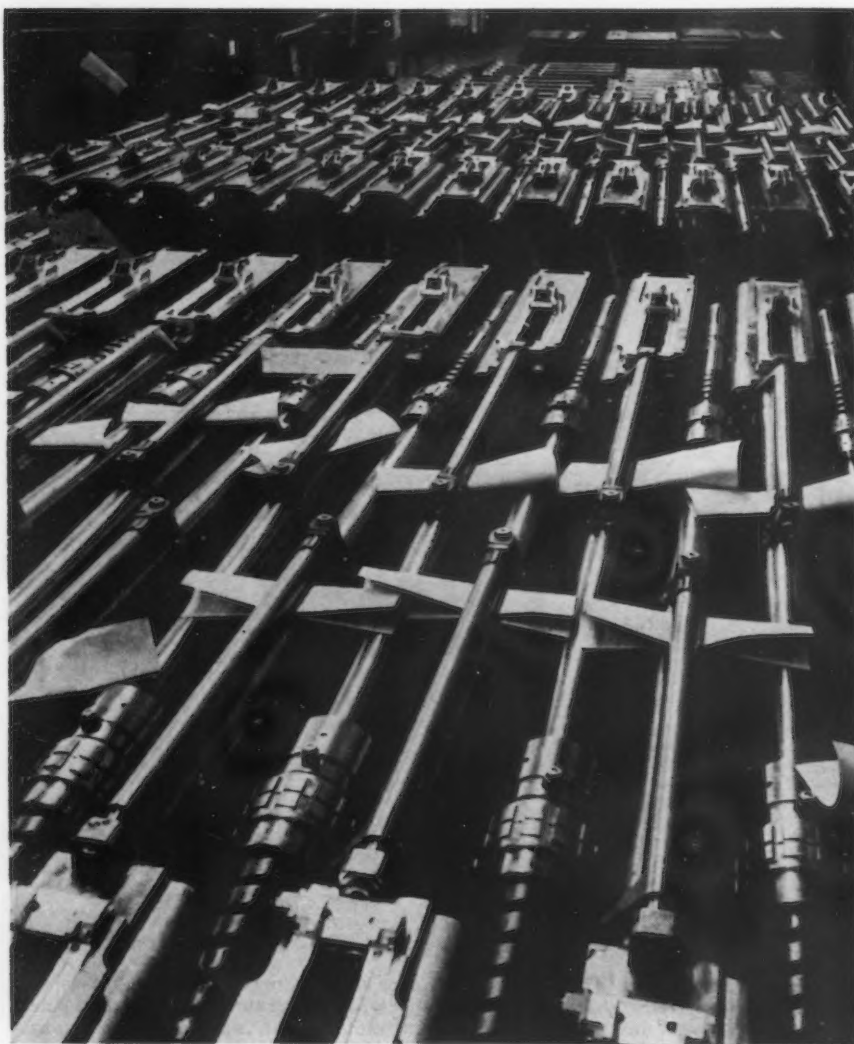
The 90 per cent of Japan's annual chromium needs which must be imported came principally from India, South Africa, New Caledonia and the Philippines. Of these pre-war sources, only the Philippines is today open to Japan. For nickel, the nearest source of supply to Japan has long been the island of New Caledonia. Since American troops are quartered on New Caledonia, it may be assumed that shipments of nickel are no longer going from there to Japan.

Over the ten years 1931 to 1940, Japan imported a total of 11,600,000 tons of scrap from the United States, and additional tonnages from other sources.

Analysis of the published reports of Japanese production of both pig iron and steel ingots since 1930 indicates the possibility that a substantial part of the tonnage of scrap imported over the past decade may today be constituting a stock-pile for the Japanese steel industry.

**FLYING GUNS:** Rows of 20 mm. machine guns, complete and ready to fire, are pictured awaiting shipment in the converted auto plant in which they were produced.

Acme Photo



## Gisholt Increases Sales and Service Representatives

Madison, Wis.

• • • To facilitate more complete and prompt service to customers in territories where there is increased industrial activity, the Gisholt Machine Co. has made several additional appointments to its field sales and service personnel. Ray Hering and Earl K. Baxter will serve the Cleveland and Detroit territories, respectively, in sales and service capacities. New direct service representatives are: John T. Murray, Dayton; Grover Pruett and Philip E. Denu, Newark, N. J.; and Alfred M. Kuehn, Lockport, N. Y., serving New York, Pittsburgh and Toronto territories.

B. C. Greene and Steel & Machine Tool Sales, Inc., will cooperate with the Houston, Texas, office. Dawson Machinery Co., Seattle, will cooperate with the Gisholt district office there. Foulis Engineering Sales Co., Halifax, Nova Scotia, will cover Nova Scotia, New Brunswick and Newfoundland territories. In addition, Gisholt announces several new agents' sales representatives.

## Association Formed for Employee Suggestions

Chicago

••• In a move to speed the pace of war production, formal launching of a new organization to be called the National Association of Suggestion Systems was announced here last week with the election as president of E. S. Taylor, director, employee suggestion system, Pullman company.

In a statement following a meeting at the Palmer House, Mr. Taylor explained that the association hopes that "by stimulating millions of employees throughout the United States to produce suggestions, we will go a long way toward winning the war."

## Foundry Accident Rate Rose 31 Per Cent in 1941

Chicago

••• According to one of the annual statistical reports issued by the National Safety Council, Chicago, the 1941 accident experience of the foundry industry was the worst since 1926. An increase of 31 per cent in the frequency rate or the number of reportable injuries per million hours of exposure raised the average rate of the industry to 21.27. This rate was 38 per cent above the average for all industries, for which average increase in frequency was only eight per cent.

The 1941 severity rate, or number of days lost as a result of reportable injuries per 1000 man-hr. of exposure, showed an increase of 20 per cent in 1941 as compared with a general industrial decrease of eight per cent. The foundry severity rate was 1.33 days of disability by 1000 man-hr. worked. Steel foundries had the highest 1941 injury rate, averaging 35.80 for frequency and 1.98 for severity.

The Aluminum Co. of America, Los Angeles, holds the best known all-time no injury record in the industry of 2,034,419 man-hr.

Increases in injury rates were especially large in the biggest foundries averaging 34 per cent for frequency and 26 per cent for severity. This is explained by the fact that expansion in operations was larger in the big foundries, according to man-hr. worked.

## Truck Transport of World War I Dwarfed by Present Facilities

••• Private and commercial truck owners are 15 times as well prepared today to assist in the war transportation effort as they were at the same period of World War I, statistics of the Automobile Manufacturers Association reveal.

For every passenger automobile available to carry war workers to their jobs in 1917, there are today six vehicles available. Both the trucks and the passenger vehicles are better and suffer fewer breakdowns than did their progenitors 25 years ago.

At the start of World War I in 1914, there were only 85,600 trucks

registered in the United States, figures of the Association reveal, but by the time of the entry of the United States into the conflict three years later the usefulness of this form of transportation had been demonstrated and the number of trucks registered had quadrupled to 326,000.

But even this increased number is dwarfed by comparison with America's present trucking resources of 4,911,500 trucks available for hauling materials to, and finished products away from, war plants, and for hauling the products of farm and factory to the railheads and seaports for shipment to our fighting forces and our allies.

**STREAMERS FOR BONDS:** Employees of Kearney & Trecker Corp. examine the "fore and aft" auto streamers supplied by the corporation as a part of their 10 per cent bond drive.



**NEW SCIACKY PLANT:** Two years after selling their first resistance welding machine Sciaky Brothers moved into this new plant on West 67th Street, Chicago. Sciaky is credited with invention of the "stored-energy" and "variable-pressure cycle" principles.







COPYRIGHT 1942—JONES & LAUGHLIN STEEL CORPORATION

## STEEL MEN USE SCRAP FOR MAXIMUM W

Like coast artillerymen in action with huge railway guns, skilled steelworkers maneuver their hundred-ton charging machines on tracks up and down the batteries of open-hearth furnaces, charging load after load of scrap metal into the seething cauldrons to make strong, fighting steels. Millions of tons of steel scrap are required to keep these war furnaces going twenty-four hours a day, seven days a week.

In adjoining mill yards trained scrap-men load the charging boxes—rush them up to the charging line. Steel scrap, and plenty of it, is vital to making quality battle-steels at a record breaking pace. In the open-hearth operation scrap quickens the process—makes possible efficient use of the natural resources, iron ore, coking-coal and limestone.

Helping men of steel to obtain scrap now for their



FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

## WAR-STEEL PRODUCTION

war furnaces enlists every industry and business — every farmer and householder. It partners everyone with the steel workers who are fighting this war with their skill and will-to-do.

**JONES & LAUGHLIN STEEL CORPORATION**

PITTSBURGH, PENNSYLVANIA

PARTNER TO INDUSTRY IN WAR PRODUCTION



## SCRAP

Like "mother" in vinegar, scrap steel in open-hearth furnaces activates and stimulates the process, gets refining action of whole batch going in right direction, particularly charge of new molten iron.

$\frac{1}{2}$  a battleship, or tank, or sub or big gun is iron or steel scrap that used to be in a discarded tractor, toy, rake, plough, kettle, tool, machine, auto, bathtub, refrigerator. The steel industry in general operates on the basis of 50% scrap, 50% pig iron. Scrap is sorely needed in the war production program. There are millions of tons of it rusting in factories and shops, on farms, in stores, around dwellings. A nationwide campaign is on now to collect and sell to scrap dealers this waste material so essential to winning the war.

The scrap dealer, who pays for waste material turned in to him by individuals, industries or civic and charitable groups, sells it in turn to industry at established, government-controlled prices. However, to make waste material usable for the mills the scrap dealer must properly sort, grade, prepare and bundle it, and also accumulate it in quantities sufficiently large to be shipped efficiently.

**Hit Hitler with junk!** Every piece of waste iron, steel, copper, brass, lead, rubber, around industrial premises, gathered up and placed where local salvage committees, or Boy Scouts, Girl Scouts, or charity organizations can collect and sell it, will be a blow to the axis.

**Industrial executives**, with authority to salvage obsolete machinery, tools, dies and all waste that has been created in their operations, are being asked to appoint salvage men, or committees, in their plants to go over the premises with a fine tooth comb and gather the last pound of salvageable junk—particularly iron and steel scrap—which is quickly usable and salable and readily turned into steel greatly needed for war.

**Housewives help make bombs** by turning in to local salvage committees their discarded appliances of iron or steel. A few hundred worn-out skillets or kettles will make one big aerial bomb.

**Gifts of scrap** may be made to local charities, service organizations or Defense Councils. If you wish to help government directly, sell your scrap, buy war stamps and bonds.

**Obsolete factory equipment**, cut up right now and sold as scrap through the regular channels will be a big contribution to our fighting forces. Equipment idle in a factory might also be considered for its immediate salable value as scrap material. The amazing industrial progress going on in America today, rapidly makes obsolete yesterday's machinery and appliances.

**Farmers can bomb Tokio**, 3 hits per minute for a couple of years, if they will rake up and sell every pound of scrap on the farm.



## How to Select a Scrap Broker

In selling iron and steel scrap it is important that you choose a broker who can rightfully claim these qualifications—

1. A reputation for trustworthiness and responsibility.
2. A record of prompt payment and readiness to adjust differences without quibbling.
3. A willingness to give extra service—such as keeping customers posted on the best prices available, finding the best markets for customers' advantage and advising on the technical problems involved.

We guarantee our customers these and other high standards of business relationships.

In our career of nearly 50 years as an iron and steel scrap broker we have built on these principles.

We solicit further opportunities to be of service in the movement of iron and steel scrap from industrial plants, railroads and scrap yards to steel mills and foundries.

### The **CHARLES DREIFUS** Company

(Scrap Broker for nearly Half a Century)

Philadelphia, Pa.  
Widener Bldg.  
Rittenhouse 7750

Pittsburgh, Pa.  
Oliver Bldg.  
Atlantic 1856

Worcester, Mass.  
Park Bldg.  
Worcester 6-2535



**MODERN VIGILANTES:** A member of the graduating class receives his civilian defense diploma at the Westinghouse East Pittsburgh plant. This plant has trained more than 850 workers in defense as a part of the 3500 being trained throughout the company.

### Sewage Gas Used As Fuel In Cleveland Disposal Plant

*Cleveland*

• • • Two engines are operating on sewage gas at the southerly plant of the Cleveland sewage disposal department, saving \$10,000 annually and freeing, for production plant use, natural gas which, otherwise, would be required for fuel, according to Cooper-Bessemer Corp., Mount Vernon, Ohio.

The gas is readily available as a byproduct in the country's sewage plants. In the Cleveland plant alone, there is sufficient gas to operate three additional engines. It is believed that every average-size sewage plant could heat its own buildings, incinerate sludge, heat the sludge in digestion tanks, as well as generate power for lighting and for machinery operation by harnessing the sewage gas which is now simply burned in most instances.

### Million Kilowatts Promised by Ickes in '44

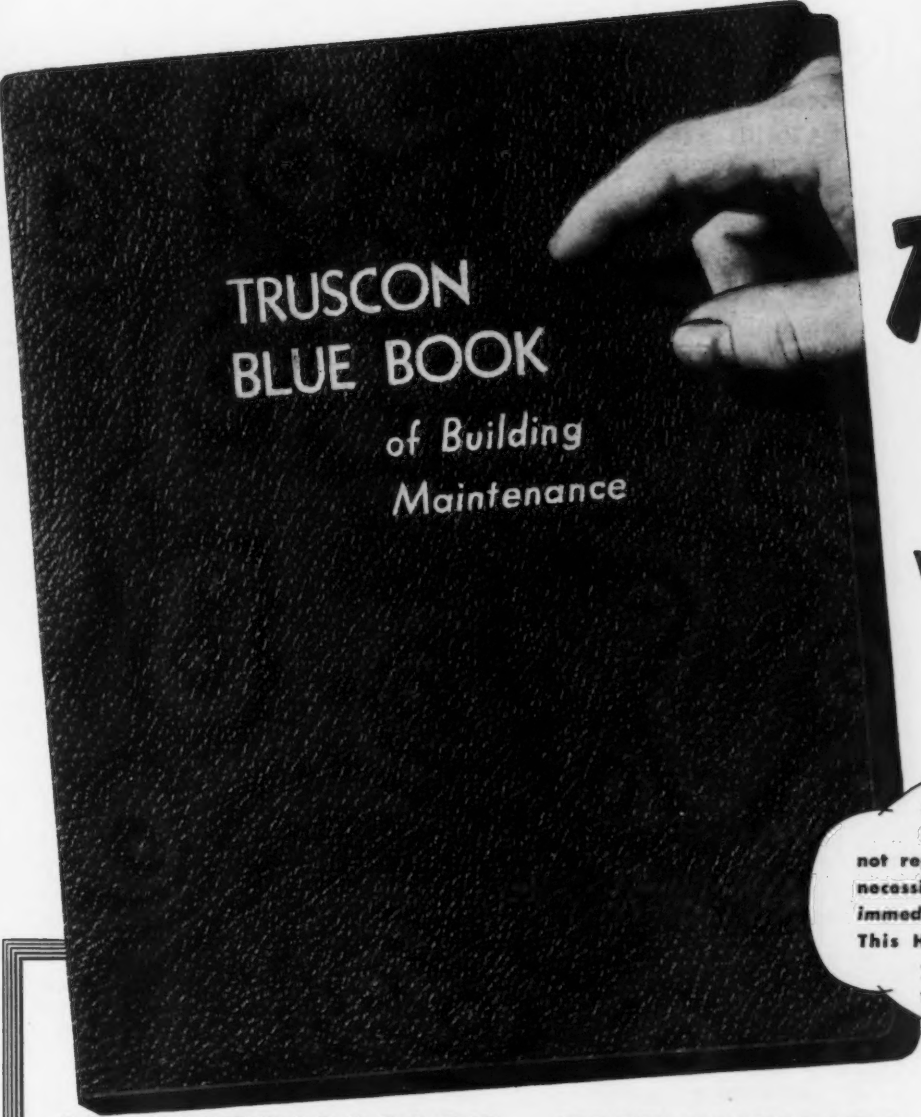
• • • A million kilowatts of hydroelectric power, to be produced by five new Bureau of Reclamation dams in the West, which have been assured of completion by new priority grants, has been promised by 1944 in a statement from Secretary of the Interior, Harold L. Ickes. The first generators to reach completion under the new priorities setup are located at Parker Dam on the Colorado river.

### Army & Navy Advertising Policies Clarified in Bulletin

• • • To keep abreast of new developments, the National Better Business Bureau again has revised its popular research bulletin "Reference to the Army and Navy in Advertising." The latest revision makes known the Navy's clearance policy for advertising with respect to WAVES and also reproduces in full the Navy department's general order No. 178 which replaces general order No. 36 on the subject of commercial advertising. The revised bulletin also makes clear the relationship of the regulations of the Office of War Information on Advertising to the Army and Navy's clearance policy on advertising.

### New Stack Coming in At American Rolling Mill Plant Ashland, Ky.

• • • The new blast furnace of the Ashland Unit of the American Rolling Mill Co. will be blown in for the first time on Aug. 24. A special dedication ceremony is to be held upon that occasion at the West Works in Ashland, during the afternoon, to be followed by a banquet in the evening. Lieutenant General William S. Knudsen and George M. Verity, together with Honorable Keen Johnson, Governor of Kentucky and other notables will be present.



TRUSCON  
BLUE BOOK  
of Building  
Maintenance

# Make Things Last

WITH

# PAINT

STRUCTURAL MATERIALS are critical materials and are not replaceable. Patriotic and economic necessity demand that you protect them immediately—make them last with paint. This HANDBOOK explains much that you should know about protecting structural material.

MAINTENANCE EXECUTIVES—

## You need this HANDBOOK!

● It simplifies your building maintenance problems. It tells you HOW—to harden cement floors—to rust-proof steel sash, tanks and structural work—to slip-proof floors and landings—to dust-proof cement floors and stairs—to acid-proof steel work—to protect and restore wood floors—to reduce sun glare—to waterproof new construction—and how to get efficient, economical solutions to many more maintenance problems.

**FREE—to plant maintenance executives. Request must be written on business stationery to Dept. I-25.**



Trade Mark Registered

# TRUSCON

LABORATORIES

DETROIT • MICHIGAN





**It Squeezes  
MORE OUTPUT  
from every minute!**

In receiving departments, along production lines, in assembly and shipping departments—Reading Hoists are helping to get many jobs done faster, with less risk of damage to finished products, or injury to workers.

For example, this 1/4-ton, cord-controlled Reading Electric Hoist is providing the speedy handling that is a must today... just as it will insure reduced maintenance costs for the after-the-war production of civilian products.

"THE WHY AND HOW of Faster Production at Less Cost"—a useful 16-page catalog to help you find out how Reading Cranes can speed production in your plant. Send for a free copy today, on your company letterhead, please.

READING CHAIN & BLOCK CORP.  
DEPT. A-9 READING, PA.

**READING**

Chain Hoists, Electric Hoists,  
Cranes and Monorails

**Quality Control Method  
Described in A.S.A. Publication**

••• Publication of the new standard "Control Chart Method of Controlling Quality During Production," (Z1.3-1942) has been announced by the American Standards Association, 29 W. 39th Street, New York. The chart mentioned carries a pair of control limits which serve the manufacturer as a criterion in deciding whether things are running smoothly or whether he should be on the lookout for trouble in the production process. Control limits are computed from quality measurements made on a number of samples of the product.

The four illustrative examples given in this standard concern the blowing time of an electrical fuse, the fat content of a woolen yarn, a component part of a piece of electrical apparatus inspected for conformity with four electrical characteristics, and the "spoilage" occurring in the manufacture of a bulk product, in this case pile floor covering. The new standard is available from the A.S.A. at 75c. a copy.

**Pittston Site Rejected  
For Aluminum Forging Plant**

••• The Aluminum and Magnesium Branch and the Plant Site Board of WPB, announced Friday that foundation borings on the Harding site near Pittston, Pa., which has been under consideration for an aluminum forging plant, had shown the location unsuitable because of quicksand strata. The WPB, it was announced, will continue, however, to attempt to utilize the manpower in the Wyoming valley of Pennsylvania, including the cities of Scranton, Wilkes-Barre and Pittston.

**Federal Launches Cargo  
Carrier After Award**

*Kearny, N. J.*

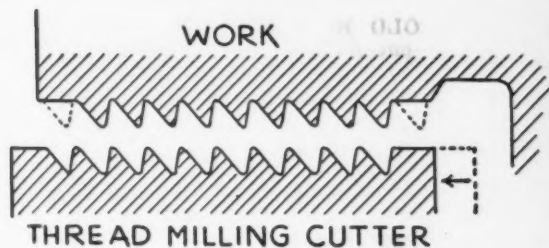
••• Less than 24 hours after Secretary Knox presented the management and employees of Federal Shipbuilding & Dry Dock Co. with the Army-Navy Production Award, Federal launched a war cargo carrier, the 10,000 ton *African Star*. Less than 50 people saw the launching last week because of wartime restrictions.

**SECOND FRONT CAMPAIGN:** Elaine Kuehne, surrounded by fellow employees of Lindberg Engineering Co., Chicago, points to a graphic chart of their "second front" production campaign which came out 37 per cent ahead of schedule for July.



# How to MILL and RELIEVE

## Precision Threads in **ONE** **OPERATION**

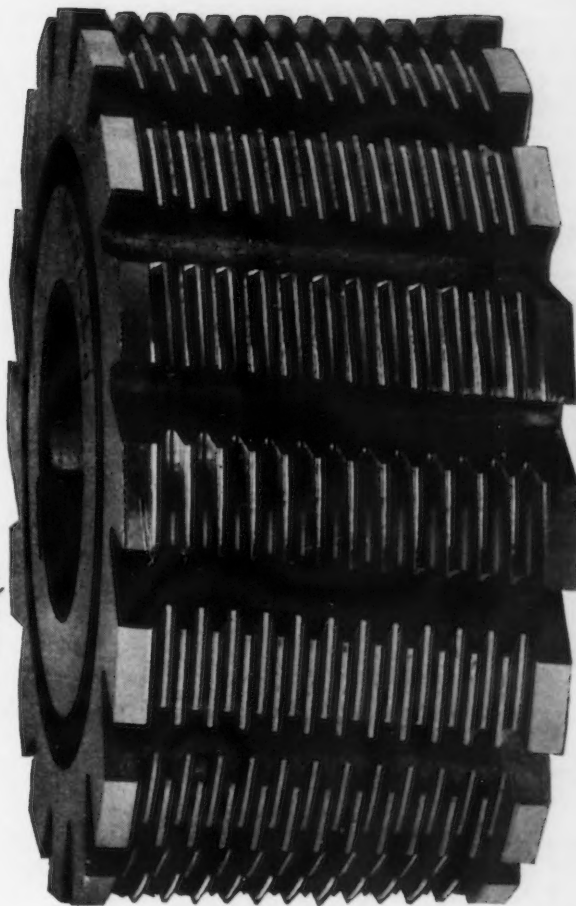


**T**hread milling, once considered a fairly "rough" method of cutting threads, today competes with thread grinding on the highest precision jobs, with the added advantage of vastly greater production speed.

Much of this is due to the accuracy to which "Detroit" multiple thread milling cutters are ground.

And now you can even relieve the ends of the threads while milling the threads, thereby facilitating assembly, reducing chance of thread damage, etc.

To do this, "Detroit" thread milling cutters, for both Buttress and National thread forms, are available with plain cutting ends on either one end or both.



In operation, as shown in the diagram, the feather edge of the thread is removed by the right hand part of the milling cutter, while the left hand end of the cutter mills the end of the shaft down to the base of the thread so that no thread is cut on the extreme shaft end.

Detroit Thread milling cutters are available for internal and external milling and both shell and shank types. They are today's standards in the aircraft industry where high precision and long cutter life is required.

THREAD GAGES  
RING & PLUG

TAPS

SPECIAL & STANDARD



**DETROIT TAP &**

**TOOL** *Company* 8432 BUTLER  
DETROIT



### Ordinance Price Adjustment Board Named for Birmingham

*Birmingham*

• • • Crawford Johnson, Birmingham industrialist, and Rucker Agee, member of a Birmingham investment company, have been appointed to the Birmingham Ordinance district's Price Adjustment Board. They will review the cases of all companies whose war contracts are predominantly for the Birmingham district.

### Iron and Steel Branch Appointments Made by WPB

• • • Don N. Watkins has been appointed chief of the steel plant facilities section of WPB's Iron and Steel branch. Mr. Watkins has been chief of both the construction and refractories units of the branch. R. C. Allen, deputy chief of the branch and formerly chief of the plant facilities section, will become assistant to Reese Taylor, chief of the branch.

### WPB Assists Industry in Getting War Contracts

*Detroit*

• • • Manufacturing sources for \$3,201,206 worth of war goods were located during the month of July in Detroit, Toledo, and Grand Rapids area, according to a report made to D. J. Hutchins, acting chief of the WPB Detroit Region. Ten prime contractors were located which took orders for war materials amounting to \$645,806, and WPB engineers assisted in locating 88 firms which negotiated subcontracts totaling \$2,555,454.

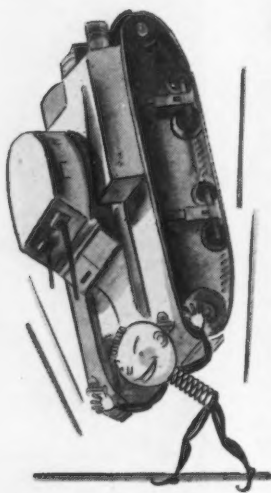
### J & L Declares Dividend

*Pittsburgh*

• • • The board of directors of Jones & Laughlin Steel Corp., at its meeting held last week, declared the stated dividend of \$1.25 a share on its new 5 per cent cumulative preferred stock, and a dividend of 50c. a share on its new common stock.

**COLD ROOM PILOTS:** Striving to put America's pilots far ahead of Axis powers, these "cold room pilots" are shown emerging from the Boeing "Strato-lab," where flying conditions encountered at 35,000 ft. are reproduced and studied.

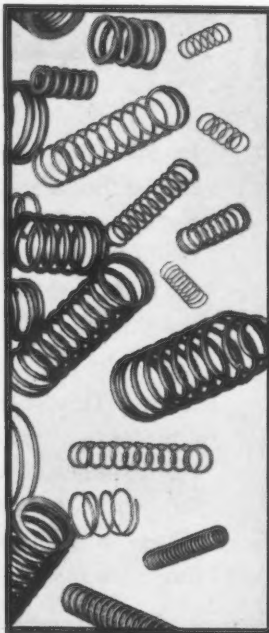
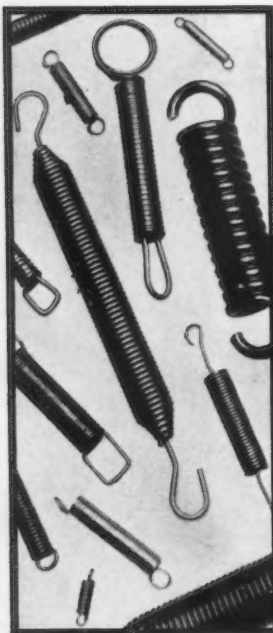
*Acme Photo*



## MECHANIZED WARFARE needs millions of springs!

SO MUCH DEPENDS ON SPRINGS . . in tanks, planes, trucks, rifles, radio and signal devices, etc., millions of springs are at work in the very heart of war equipment . . tripping or releasing . . pushing or pulling . . holding apart or forcing together . . absorbing shocks or delivering blows.

IF YOU NEED SPRINGS, wire assemblies, wire parts or small stampings for war equipment, Cuyahoga's wide experience and facilities for applying the flexibility of spring and wire design to defense applications is available for direct war or sub-contractor requirements.



**CUYAHOGA SPRING CO.**



10250 BEREA ROAD  
CLEVELAND, OHIO



## Who Is He?



Reese Taylor

••• Those who know, say Reese Taylor, chief, iron and steel branch of WPB, is not a great speech maker, grandstander, or front man but he is a great organizer, firm in judgment and action, and commands the respect of all who contact him.

When he went in the iron and steel industry on the West Coast he started as a structural worker and back in 1929 when Consolidated Steel Corp. was formed out of a number of local concerns Taylor was made production manager. In 1934 he headed the outfit but four years later the Union Oil Co. of Cal. wanted a top-flight worker to head its company and "copped off" Reese as president and general manager. Back in the days of the silent movies, Taylor, who was a tinkerer with things mechanical, invented gadgets used by Hollywood and it is said that the magic carpet in the "Thief of Bagdad" was made possible by Reese Taylor's ideas and mechanical trend of mind. Then, while at the Consolidated company he pitched the executives to a victory in softball over the drillers. They say he is no stuffed shirt, not much of a country-club man, works hard but is humane in his dealings with his associates and has come to be as well liked in Washington and throughout industry as he was out West—where everyone swears by him.

## New England Coal Leases Dock

Boston

••• To supplement present facilities at its Everett, Charlestown and Beverly, Mass., plants, the New England Coal & Coke Co., a subsidiary of the Eastern Gas & Fuel Associates, has leased space at the Mystic Terminal Co. dock, with storage capacity for 100,000 tons of bituminous coal.

## U. S. to Lend \$6 Million To Altos Hornos Steel Plant

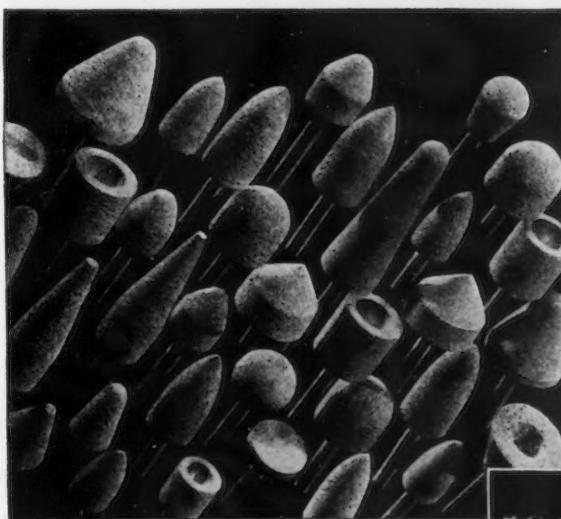
••• The Export-Import Bank has agreed to lend up to \$6,000,000 to the Altos Hornos steel plant at Monclova, State of Coahuila, Mexico. Repayment is guaranteed by the government of Mexico. The funds will cover the cost of new and second-hand equipment and materials and of services in the United States.

## C.V.R.R. Gets Contract for Supplementary Machine Work

Boston

••• Supplementing work being done on locomotives and cars used in the transportation of war commodities and personnel, contracts have been signed for the machining at the Central Vermont Railroad shops of government equipment.

## FINISHING THE *JOB* BEHIND THE LINES



CHICAGO MOUNTED WHEELS

Made of V/T Super Bond, they have real stamina, give unmatched performance and last 150% to 300% longer than ordinary wheels.

Chicago Wheels were the first small wheels mounted on steel shanks. Today there are over 200 different shapes to serve you—made in a variety of abrasives, grains and grades, mounted on shanks of various lengths and diameters of 1/4", 3/32", 1/8" and 3/16".

### TRY ONE ABSOLUTELY FREE

Tell us the kind of job, size and wheel speed you use, and we'll send you a test wheel postpaid.

### BRAND NEW CATALOG

Just off the press, this book is prepared in the modern manner—loads of illustrations, concise descriptions of the complete line of Chicago Mounted Wheels. Send for copy.

## CHICAGO WHEEL & MFG. CO.

Makers of Quality Products for More than 40 Years

1101 W. Monroe St., Dept. RA, Chicago, Ill.

Keeping up with Uncle Sam's victory drive for more tanks and guns and planes, Chicago Mounted Wheels are doing a big finishing job in shops everywhere—taking care of every kind of delicate or tough grinding job faster, smoother and better.



HI-POWER GRINDER

A real production grinder that is saving many man hours. Weighs 3 lbs. yet is so well balanced that fatigue is practically eliminated. Has enough power to drive a 2 1/2" diam. wheel. Speed 17,000 r.p.m. In case with 3 Chicago Mounted Wheels, Drum Sander and Bands, extra Collets, Wrenches, Dressing Stone, \$38.50.

☐ Send Hi-Power ☐ Catalog RA-8  
☐ Free Wheel. Size.....  
 Name .....  
 Address .....



### Manual on Lathe Operation Issued by Sheldon Machine Co. Chicago

• • • "The Care and Operation of a Lathe" is the title of a new pocket-sized manual published by the Sheldon Machine Co., Inc., 4258 North Knox Avenue, Chicago. The purpose of the book is to enable the beginner to understand the modern metal-cutting lathe,

its parts and functions; to teach the proper care of the lathe; to explain the grinding of cutters, and tools and to show how they should be set up; and to show proper methods for holding the work.

The manual is well illustrated with simple sketches which add immeasurably to making the subject matter easily understood. The scope of the book is indicated by the fact that it contains a chapter

on uncrating and setting up lathes. Its simple and thorough coverage of the subject should make it very valuable for beginner or apprentice classes, as well as for refresher classes. Copies are available from the publisher at 50c. each.

### Data on Shot Heat Treating Given in Houghton Booklet

• • • Considerable data on the heat treatment and quenching of A.P. shot is given in the July, 1942, No. 7, issue of "War Production Data" issued by E. F. Houghton & Co., Philadelphia. In the same issue there is a short article on the heat treatment of high explosive shells, a review of some tests made on coolants for machining magnesium, and recent developments in drawing compounds for brass artillery shell cases. A brief article on the heat treatment of struts for aircraft is also included. The booklet is available for distribution to men in responsible positions in war plants.

## HIGH-SPEED PRODUCTION + CLEANING

This is a war of men against metal. Of machine against machine, and of metal against metal.

Metal cleaning is an important part of all present-day manufacture — whether it is machine guns, airplane parts, cartridge cases (brass and steel), A. P. and H. E. shot, or ammunition boxes. Ammunition and equipment cannot be put into service faster than the component parts can be cleaned.

In these swift-moving times Wyandotte Field Engineers are on call twenty-four hours a day. They are constantly in the field — working with those in charge of metal degreasing in the arsenals and the production shops of the nation.

If you have a problem in metal cleaning, the chances are that a Wyandotte man has met that problem or its twin brother, in the course of his daily work. He will be glad to work with you to obtain improved results, increased speed, or lower costs. *Many times Wyandotte has solved all three problems at once.*

*We are ready to help you NOW!*



THE J. B. FORD SALES COMPANY • WYANDOTTE, MICHIGAN

**WHEELED WASHING MACHINE SAVES GAS AND SHOES:** Merri-deth Wilson of Westinghouse Research Laboratories, Pittsburgh, contrived this motor bicycle by using a gasoline operated washing machine motor and his old bike. Wilson claims 100 miles per gallon and great saving on shoe leather.





**"OK" FOR KNUDSEN:** Edward G. Budd, president of the Edward G. Budd Mfg. Co., is shown above as he presented a pass to Lieutenant General William S. Knudsen, Director of Production for the War Department, to "permit" him to go through the Philadelphia Budd plant for a routine inspection.

#### Booklet on "Gaging Policy" Issued by Sheffield Corp.

Dayton, Ohio

• • • As a supplement to the first edition of "Dimensional Control," the Sheffield Corp., Dayton, Ohio, has prepared a 16-page booklet on "Gaging Policy." This booklet amplifies the data on allocation of gage tolerance and wear allowance, and discusses in detail the Army Ordnance practice in this regard. The information on thread gages has also been enlarged. The booklet is profusely illustrated with diagrams and charts in color.

#### New Analysis Chart Issued

Cleveland

• • • The American Steel & Wire Co. has produced a new chart giving chemical composition limits of AISI, SAE and NE (National Emergency) standard steels. Nearest aeronautical material specifications are included. The chart is approximately 14 x 22 in. in size, usable as a wall hanger, also hinged so it can be folded to 11 x 14 in.

Copies may be obtained without charge by writing on business letterhead to advertising department, American Steel & Wire Co., 408 Rockefeller Building.

#### Safety Digest Published

Boston

• • • A pamphlet containing 10 articles relating to safety in industry has recently been published by the American Mutual Liability Insurance Co., 142 Berkeley Street, Boston. The subjects covered in the "Safety Digest" include portable electric tools, chemicals in industry, industrial X-rays, industrial dermatitis, organization of

a plant fire fighting department, duties of a watchman as regards safety, and precautions to be taken by women working in industry. There is also an article on protective clothing for workers, safety in the home and on the streets and general precautions to be taken by workers in plants to prevent accidents from numerous sources. The booklet contains 56 pages and is full of factual data and concrete examples.

# MICCROIL

The ALL-PURPOSE High Flash Anti-Rust Oil



Here Are The Results Of  
**EXHAUSTIVE TESTS**  
Proving That Microil . . .

. . . has 42.5% total solids—more than 40% higher than all similar oils tested.

. . . dries in 30 to 45 minutes—extremely fast for a high flash oil.

. . . resisted corrosive action almost indefinitely in a plating plant where the relative humidity varied from 92% to 96% at 87° F.

. . . showed practically no deterioration after 48 hours in a continuous spray of 20% salt solution with the relative humidity at 96% and the temperature 80° F.

*Offers*  
**COMPLETE  
PROTECTION**  
TO PARTS SUCH AS THESE

*In Storage  
In Transit*

. . . showed no change after being exposed to weather for more than four weeks on roof of plant. Tests conducted in Detroit during month of January.

NOTE: The three exposure tests were made with Microil applied on both polished and unpolished steel panels.

**WRITE FOR COMPLETE DETAILS**

**MICHIGAN CHROME & CHEMICAL CO.**  
6338 EAST JEFFERSON DETROIT, MICHIGAN



## Trade Notes . . .

**Industrial Oven Engineering Co.**, with offices at 11621 Detroit Avenue, Cleveland, has been formed from the former Industrial Oven Engineering Division of the Metal Equipment Co., together with a newly formed contract engineering department. C. A. Litzler is chief engineer of the new organization.

**Abrasive Machine Tool Co.**, East Providence, has appointed the following sales representatives: Russel, Holbrook & Henderson, New York, to cover eastern New York and northern New Jersey; C. H. Briggs Machine Tool Co., Syracuse, N. Y.; George Keller Machinery Co., Buffalo; Motch & Merryweather

Machinery Co., Cleveland, to cover Erie county, Pa., in addition to the territory it has served in the past; Swind Machinery Co., Philadelphia, to cover several additional counties in northern Pennsylvania. These replace Henry Prentiss & Co., recently retired from business.

**Krembs & Co.**, Chicago, has appointed Universal Power Corp., Cleveland, its stocking distributor of welding products, for northern Ohio.

**Wheelco Instruments Co.**, Chicago, has named the following sales outlets for its products in South America: Cia Argentina de Ingenieria Industrial, 375 Peru, Buenos Aires,

to represent Wheelco in Argentina; Miguel Khalife, with A. P. Green Chilena Ltda., Casilla 13297, Santiago, Chile, and Benech & Cia, Cerrito 455, Montivideo, Uruguay.

**J. Jacob Shannon & Co.** have opened a new office, showroom and warehouse at Broad and Huntingdon Streets, Philadelphia.

**Francis I. DuPont & Co.** and Chisholm & Chapman have changed the name of their firm to its original form, Francis I. DuPont & Co.

**York Ice Machinery Corp.**, Pittsburgh branch, is now located in the Hostetter Building, 7 Ferry Street, Pittsburgh.

**Scully Machinery & Equipment Corp.** has moved to 2031 West 74th Street, Chicago.

**Federal Products Corp.** has moved its sales and advertising departments to 1 Reservoir Avenue, Providence.

**Strippit Corp.**, Buffalo, has bought a steel and concrete building at 345 Payne Avenue, North Tonawanda, N. Y., to which all production facilities and general and executive offices will be moved by mid-September.

**Champion Rivet Co.** has moved its Houston office to 1813 Esperson Building.

**Hays Corp.**, Michigan City, Ind., manufacturer of combustion instruments and controls, has appointed the Energy Control

**RUBBER-COPPER SALVAGE:** Engineers of the Timken Roller Bearing Co. have converted a standard Buffalo bending roll into a device for stripping rubber insulation from copper cable. Former practice was to burn the cable to salvage the copper, but substitution of a notched gripper wheel for one of the smooth lower wheels now permits a complete reclaiming job.



**Quick Economical Solutions to Many Design and Production Problems**

**SPRINGS**

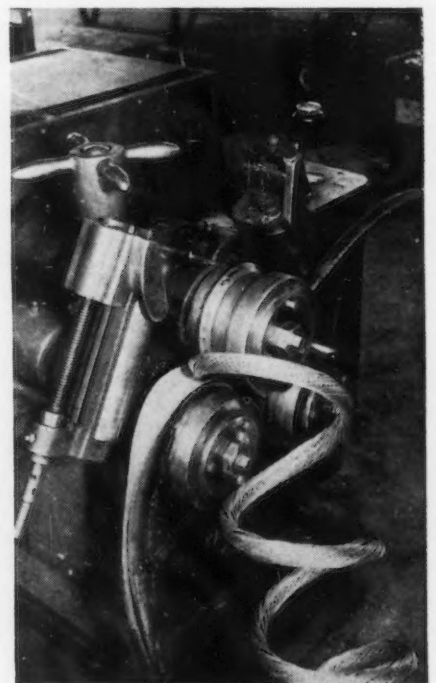
**STAMPINGS**

**WIRE FORMS**

What type of Spring, Small Stamping, or Wire Form is most suitable? What is the best kind of material to make it out of? How can it be applied to your product to best advantage?

Whatever your problem may be, call on Hubbard for information and recommendations on the many types and uses of Parts Like These.

**M·D·HUBBARD SPRING COMPANY**  
331 Central Ave. • Pontiac, Mich.



## NEWS OF INDUSTRY

Co., Philadelphia, its representative in eastern Pennsylvania, Delaware, and portions of Maryland, New Jersey, Virginia and West Virginia; Engineering Products Co., Charleston, W. Va., its representative in southern West Virginia; and Power Specialty Co., Houston, its representative in southeastern Texas.

Lo-Hed Hoist division, American Engineering Co., Philadelphia, has appointed the Eiler Equipment Co., Minneapolis, its representative on electric hoists.

Universal Consolidated Products Co., Los Angeles, has purchased a machine shop at Ripon, Wis., to be used as a fabricating plant for steel material en route from eastern steel mills to its plant at Los Angeles.

T. R. Wigglesworth & Co. has moved to larger quarters at 1721 Superior Avenue, Cleveland, and are now engaged in rebuilding machine tools and contract production work as well as their regular business of trading machinery.

Kaydon Engineering Corp., Muskegon, Mich., and Commercial Credit Co., Baltimore, have merged, and will produce specialized bearings for war use.

Anderson Tool & Die Works, Providence, has started work on a one-story plant addition.

Liberty Tool & Gage Works, Inc., Providence, has awarded the contract for construction of a small plant addition to C. E. Bigney Construction Co., Providence.

The Madison Brass Works, Inc., has been formed at Madison, Wis., to succeed the part-

nership formerly existing between Henry W. Vogts and Harry F. Vogts. Personnel will remain the same.

Webster Electric Co., Racine, Wis., expects to complete four new factory units this summer.

American Hydraulics, Inc., Fond du Lac, Wis., is moving its plant and production facilities to Sheboygan, Wis., where it will occupy the former Globe Co. plant.

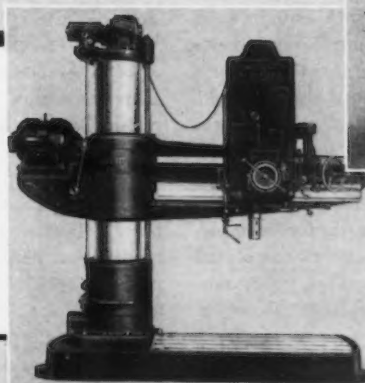
Maydwell & Hartzell, Inc., San Francisco and Los Angeles, have been appointed exclu-

sive sales representatives for California for Pittsburgh Screw & Bolt Corp.

Salem Engineering Co., Salem, Ohio, has purchased the Tolerton Engineering Co., Youngstown, Ohio, which will be operated as a subsidiary with offices at 813 Market Street, Youngstown.

Blanchard Machine Co., Cambridge, Mass., has appointed the following sales representatives: C. H. Briggs Machine Tool Co., Syracuse, N. Y., for central New York and northeastern Pennsylvania; George Keller Machinery Co., Buffalo, for western New York.

### FARREL-SYKES HERRINGBONE GEARS



### Used in CINCINNATI-BICKFORD RADIALS

When a machine tool maker combines speed, accuracy, power and durability in a precision tool, the design calls for gears with a proven record of greater strength and smoother running performance. Because Farrel-Sykes Gears provide these characteristics, they are used in the Cincinnati-Bickford Tool Company's Super Service Radial Drilling Machines. Shown above are the Super Service Radial and the continuous tooth herringbone gears used for the final slow-speed spindle drive.

Farrel-Sykes Continuous Tooth Herringbone Gears are especially suited to meet the demands for extra strength and load-carrying capacity and the ability to withstand shocks, stresses and wear from continuous heavy duty operation of modern machines. Because of their precision generation by the famous Sykes Process they are exceptionally quiet and smooth-running. The combined characteristics of overlap or

interlacing of the teeth, creeping engagement and inclined line of pressure, reduce wear and maintain the involute profile and correct tooth action throughout the life of the gear. Opposed helices balance and absorb axial thrust within the gear member, eliminating harmful thrust loads and resultant stresses on other parts of the machine.

Farrel-Sykes Gears are ideally suited for many machine tool applications and are used in many well-known machines. We make gears and gear units for every type of service and offer the services of an experienced engineering staff for consultation on gear problems.



**FARREL-BIRMINGHAM COMPANY, INC.**  
344 VULCAN ST. BUFFALO, N. Y.

The Gear with **FARREL** a Backbone





## Jeppson Urges Cooperation Of Abrasive Industry in Drive

••• Serving as liaison between the American Industries Salvage Committee and individual companies in the abrasives industry, George N. Jeppson, president, Norton Co. has written to companies in the industry urging full and complete cooperation with the program of the Industrial Salvage Section of WPB. He has also asked that each company appoint

a responsible official to assist in any way possible the local general Salvage Committees that have been established by the WPB in 12,000 communities.

## "Victory" Drum Developd

••• Development of a plywood drum for use in marketing greases will enable the Standard Oil Co. (Indiana) to save steel. The new "Victory" drum is similar to steel in appearance, though it is made of laminated wood.

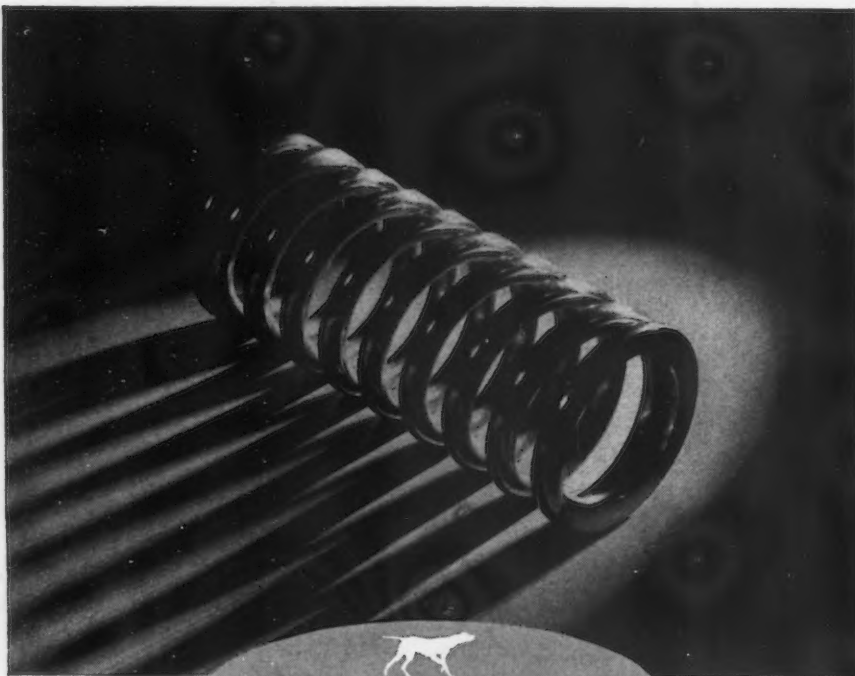
## Ready Before the Shootin' Started

BEFORE Pearl Harbor, before even Dunkirk, reliable spring manufacturers were quietly stiffening themselves for a shooting war. To most of them, the design and manufacture of a spring was no longer a matter of conjecture, but a problem in mathematics, physics, chemistry, and ingenuity.

In the case of Hunter, for example, searching tests had been completed on every imaginable kind of spring material, often using equipment conceived

and built in the Hunter laboratory.

War demands have increased standards of precision in manufacture but none for which Hunter and other recognized spring makers are not professionally prepared. The war has greatly increased the rate of production. Precision inspection, which might have been a bottleneck, had, however, already been licked by Hunter. In the peace to come, as well as in the war at hand, anticipation is 90% of the battle.



**HUNTER**

*Science in Springs*

HUNTER PRESSED STEEL COMPANY, LANSDALE, PENNSYLVANIA

## Pound Foolish

New York

••• Observers here suggest that a return to the old fashioned habit of referring to iron and steel in tons rather than pounds would be appropriate. Citing a WPB press release from Washington referring to 1,000,000 lb. of iron and steel scrap, they ask if aluminum and copper will now be measured in ounces in view of their scarcity.

## Follansbee Earning Up Over First Six Months of 1941

Pittsburgh

••• Follansbee Steel Corp. and subsidiaries report for the six months ended June 30, consolidated net profit after estimated taxes and all charges, of \$202,976, equal to 64c. a share on the common stock outstanding after providing for cumulative dividends on the 5 per cent preferred stock. These earnings compare with an adjusted \$136,295 or 33c. a share after taxes and preferred dividends for the corresponding 1941 period. Provision for Federal income taxes for the six months ended June 30 was \$167,000, compared with \$61,000 in the same 1941 period.

## COMING EVENTS

- Aug. 23 to 26—National Association of Power Engineers, New Orleans.
- Sept. 1 to 11—Building and Construction Trades Council, Atlantic City.
- Sept. 2 to 5—Roadmasters and Maintenance of Way Association of America, Chicago.
- Oct. 7 to 10—The Electrochemical Society, Inc., Detroit.
- Oct. 12 to 16—National Metal Congress and Exposition, Cleveland.
- Oct. 15 to 17—Federation of Sewage Works Association, New York.
- Oct. 16 and 17—War Production Conference of American Society of Tool Engineers, Springfield, Mass.
- Oct. 18 to 21—American Public Works Congress, Chicago.
- Oct. 19 to 23—Wire Association Meeting, Detroit.
- Oct. 27-29—National Safety Congress Association, international convention, Chicago.
- Nov. 17 to 22—National Chemical Exposition, Chicago.
- Nov. 30 to Dec. 3—American Society of Mechanical Engineers, annual meeting, Hotel Astor, New York.
- Nov. 30 to Dec. 5—National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

## Great Lakes Steel Signs CIO Contract

Detroit

••• The first labor contract between any large steel company and the CIO, that has been consummated without resort to mediation by the War Labor Board or any other governmental agency since the entry of the United States into the war, was signed Monday by the Great Lakes Steel Corp. and the United Steel Workers of America (CIO). The Great Lakes Steel Corp., a subsidiary of the National Steel Corp., employs about 6000 persons and is engaged 100 per cent on war work, according to George R. Fink, president of the company.

Wage raises of 5½ cents an hour are set up in the new contract and are retroactive to Jan. 1, 1942, providing nearly \$500,000 in retroactive pay increases. The contract also provides for exclusive bargaining rights to the USWA, a maintenance of membership clause, and the checkoff of union dues. The contract was ratified unanimously Sunday night at a meeting of the USWA, whose members are employees of the company, and signed Monday by George R. Fink, president.

Vastly improved grievance machinery and seniority provisions were included in the new contract, according to union representatives, and vacation allowances ranging from two days with pay for low seniority workers up to 12 days with pay for employees who have been at the plant for 15 years are also included.

## Allegheny Ludlum Mark Reflects 1940 Expansion

Pittsburgh

••• Largely as a result of Allegheny Ludlum Steel Corp.'s expenditure of several million dollars in expansion and modernization, started in 1940, the company reports that the monthly value of shipments of its special steels in July, 1942, had risen to 9¼ million dollars which was a 23 per cent increase over the 1941 monthly average of 7½ million dollars in shipments. Moreover, the company expects that war production drives will push this increase higher before the end of 1942.

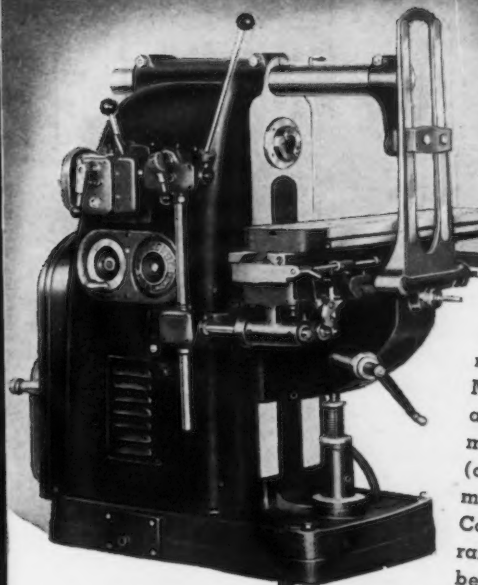
To match expanding production,

the company has made a number of management changes and created additional top executives. This rearrangement was marked by placing all plants in the Pittsburgh area under unified management in 1940 and the creation of a development engineering department and a scrap and salvage department in 1941. The company has been assisting its customers in developing better uses for its product.

## Steel Broker Restrained by OPA

••• The OPA's first action to clamp down on the "black market" in steel has resulted in the filing of a suit on Aug. 14 and the obtaining of a temporary restraining order against Willard P. Markle of Houston, Tex. This action came only 10 days after the OPA had launched an inquiry into the charges of officers of the Higgins Industries, Inc.

# For SMALL-PARTS PRODUCTION



## SIMMONS 1A MILLING MACHINE

Designed for the rapid production of small parts, Simmons No. 1A Micro-Speed Milling Machine is efficient and simple to operate. By means of Micro-Speed Drive, (our own variable speed transmission) and Selector Dial Control, any speed in its wide range—56 to 630 R.P.M.—may be instantly obtained at a turn of the handwheel adjacent to the selector dial on the column. Thus the operator is assured the right speed for the job. And that means higher precision . . . faster, more economical production! Write TODAY for descriptive bulletin.

### SPEEDS:

56-630 R.P.M.

### RANGE OF FEEDS:

Horizontal, 34";

Cross, 8";

Vertical, 18½".

TIMKEN BEARING  
EQUIPPED

- MICRO-SPEED DRIVE
- SELECTOR DIAL CONTROL
- SPINDLE BRAKE & CLUTCH

## SIMMONS MACHINE TOOL CORPORATION

Main Office: 1721 NORTH BROADWAY, ALBANY, N. Y.

New York Office: 149 BROADWAY

# SIMMONS

LATHES • TURRET LATHES • MILLERS • PLANERS • 6" BAR BORING MACHINES





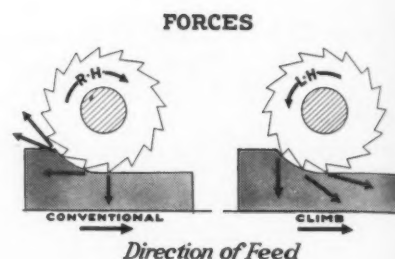
## Machine Operators Taught by Pictures

Milwaukee

••• A new simplified method of teaching machine tool operators the right and wrong way of operating milling machines has been developed by Dr. N. A. Frommelt, in charge of industrial education of Kearney & Trecker Corp. The procedure, which employs 35 mm.

color slides and records, is meeting with wide approval from both industrial plants and vocational training schools. The company is making this material available to industrial plants and educational institutions for either rental or purchase at a nominal fee.

This milling practice program was designed for a three fold purpose—to provide means of training unskilled men more rapidly, to



give technically minded students a clearer picture of the hows and whys of milling practice than is available under training programs now in general use, and to enable those already engaged in the industry to do better work in less time.

The material is divided into five parts, the slides composing each section consisting of drawings, sketches and tabular material. A brief outline of each part is as follows.

Part one covers the fundamentals of good machine tool practice, such as making correct setup for fast cutting and dimensional accuracy. A standard type of machine is reviewed from a construction and operation standpoint. The use of cutters and arbors, types and sizes, is also mentioned.

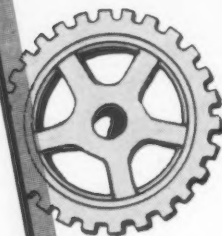
Part two is devoted to a further consideration of the requirements for good cutting and dimensional setups. In this part, however, the machine is discussed from an actual operation standpoint. The "correct approach" to the job—or the know-how to the correct cutting setup by the operator is brought out clearly. Conventional and climb milling is explained along with the conditions affecting speeds and feeds, the selection of cutters and the use of coolant.

Parts three, four and five are composed of a series of actual machine setups and milling operations which are used to demonstrate the principles which have been described in parts one and two. These discussions point out the right and wrong methods so

# PYOTT

Pyott is not only a dependable source of supply when you need sprockets, pulleys, gears or sheaves, but a dependable source of information for solving power drive problems. Forty-six years of knowing how and doing it right, are at your service.

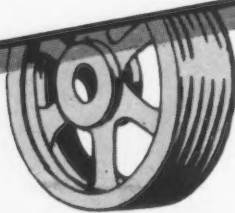
Pyott Multiple V-Belt Drives conform to all the engineering specifications established by the Multiple V-Belt Drive Association.



SPROCKETS



GEARS



SHEAVES

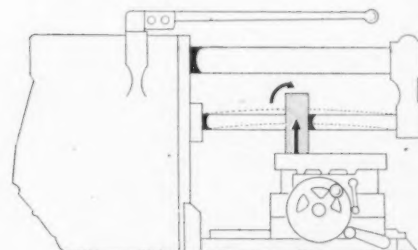


PULLEYS

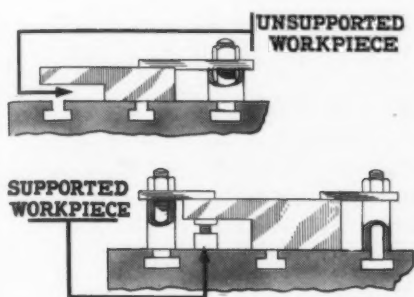
**PYOTT FOUNDRY AND MACHINE COMPANY**

328 NORTH SANGAMON STREET • CHICAGO

Also CAST IRON AND GRAY IRON CASTINGS

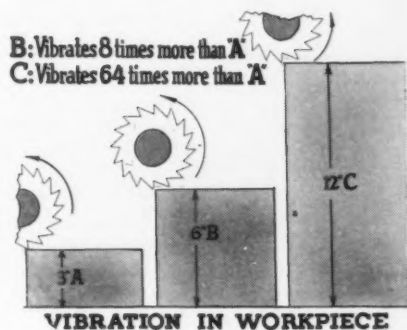


UNSUPPORTED ARBOR



that the trainee understands the difference in the result.

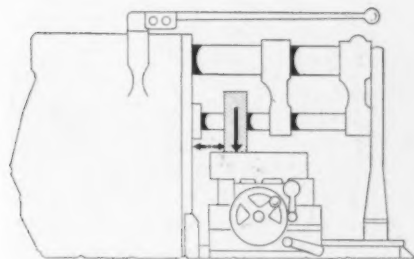
For each film there is a set of practical questions and answers for the supervisor to use immediately after the showing of the film. This informal discussion is for the purpose of clearing up any uncertain points for the trainee. Also included are basic problems on ship load, surface feet per min-



ute as related to the selection of speeds and feeds, as described in parts three, four and five.

In addition to the five sections listed above, a sixth film is available for review purposes. The first two parts may be considered as basic instruction for beginners and apprentices. The remaining three are more advanced.

This training program is based on extensive field investigations by Dr. Frommelt, who designed the material to suit the expressed needs of industrial plants which



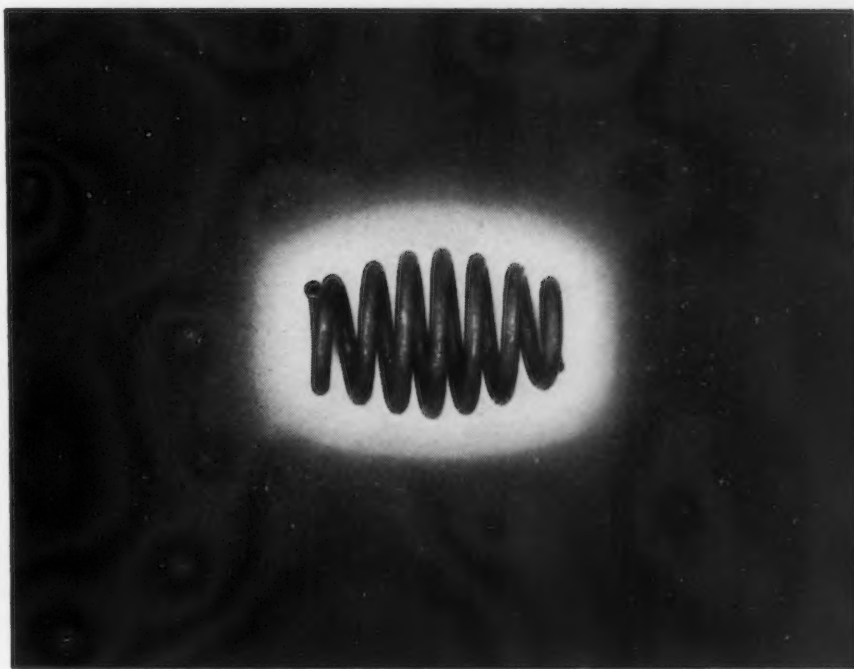
SUPPORTED ARBOR

reported a dearth of effective material for basic training.

The film has been highly praised by the bureau of industrial and technical education of New York State and is being recommended to other similar organizations throughout the country by the bureau. Further information on this training material may be had from the department of industrial education, Kearney & Trecker, Corp., Milwaukee.

### Rubber Savers Rewarded

• • • Specific evidence that each company is helping to save rubber, "Conservation Honor Roll" certificates are being distributed by Goodyear Tire & Rubber Co. to firms which cooperate in its industrial rubber products conservation program. The program includes an illustrated talk by Goodyear technical representatives on proper care and maintenance of mechanical goods which contain rubber.



TODAY a multitude of springs, both conventional and special shapes, are being coiled to rigid standards, for incorporation in weapons of war. The speed and precision of Torrington Spring Coilers are tremendous assets to the professional springmakers meeting these demands.

The barrel type spring above is only a symbol of progress—a symbol indicating that nearly any useful spring can be coiled rapidly, automatically, accurately.

If you need springs, you'll get better ones quicker, if they're made on a Torrington Coiler. If you need a Spring Coiler, you need a Torrington Coiler.

Complete specifications on both segment and clutch type coilers free by addressing your inquiry to us today.



**THE TORRINGTON**  
MANUFACTURING COMPANY  
TORRINGTON, CONNECTICUT



## Deadline Set for PRP Third Quarter Applications

Washington

• • • Because WPB facilities for processing PRP applications are now taken with handling fourth quarter applications, J. A. Krug, deputy director general for priorities control, announced on Tuesday that no additional third

quarter applications can be processed unless they are sent in at once.

Companies which do not submit third quarter applications immediately are now advised that they cannot be accepted under PRP until the next quarter. The only exceptions to this rule are new companies or plants just beginning production.

## Observers Predict WLB Will Grant U.S.S. 44c Day

Washington

• • • Labor observers here predict that the result of the War Labor Board hearing on Tuesday on the USW-CIO demands for the decision in the "Little Steel" case to be applied to five United States Steel Corp. subsidiaries will be the granting of the 44c. a day increase, the closed shop and the check-off. There was a division of opinion whether retroactive pay increase back to Feb. 6 will be granted. The retroactive pay increase applied to the United States Steel Corp. subsidiaries, according to its representatives, would be in violation of an outstanding contract with SWOC which did not expire until Aug. 9.

Moreover, it was pointed out

# SCRAP SALVAGE Problems Easy

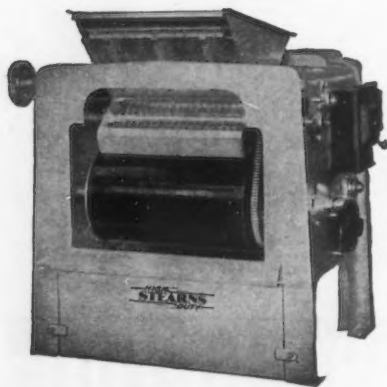
for

*Stearns*

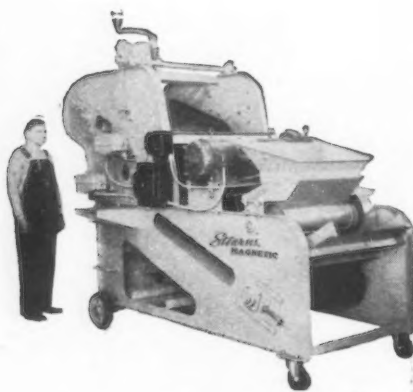
## MAGNETIC SEPARATORS

"Clean" scrap metal is being most emphasized in the nation's conservation program.

Your bronze, aluminum and other secondary metals can be reclaimed from borings, turnings, chips and other metal



Stearns Magnetic Drum Type "L" Separator for medium capacities. Bulletin 46.



Stearns Magnetic Double Pulley Separator for large capacities. Write for Bulletin 302.

refuse most efficiently, economically and automatically with these Stearns Magnetic Separators.

With improved design through better engineering, Stearns Magnetic equipment will pay for itself quickly—a definitely profitable investment—an aid to better metal salvage.

No doubt you are interested in increasing the value of your scrap metal. Investigate Stearns Magnetic methods. Ask for our suggestions. No obligation.

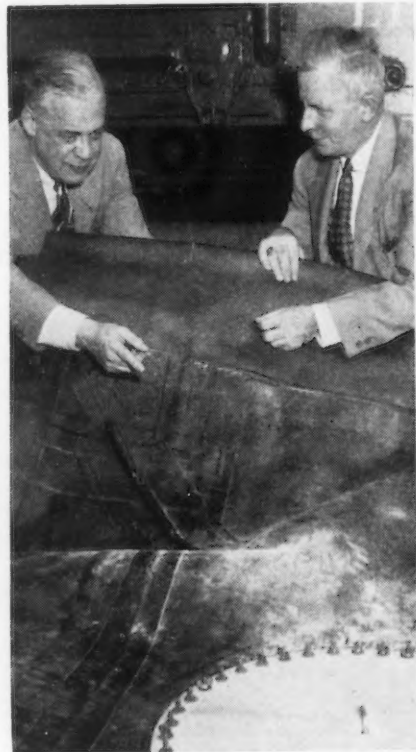
## STEARNS MAGNETIC MANUFACTURING CO.

635 E. 28th St. Milwaukee, Wis.

CLUTCHES—PULLEYS—DRUMS—MAGNETS



**OIL IN RUBBER BAGS:** Now being tested, are bags made of synthetic rubber, for possible use in transporting oil, gasoline, etc., in box cars and open trucks. Developed by the Glenn L. Martin Co., they are being inspected in this view by Joseph B. Eastman, director of ODT (left), and Reid B. Gray, chief of Glenn L. Martin laboratories.



that the case was not certified to the WLB until Aug. 10, and that if the same pattern is followed in the Steel Corp. case as was followed in "Little Steel," retroactive pay would only apply to the date of certification. Other features, such as were provided in the "Little Steel" decision, including the check-off, obviously could be written into a new contract.

On this question, John A. Stephens, who presented the case in behalf of the American Steel & Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., National Tube Co. and Tennessee Coal, Iron & Railroad Co., made the following argument:

"These companies feel that a fundamental principle is involved in this issue. That principle relates to the cornerstone of union-management relation—the contract. Any action by these companies in acceding to the demand of the union would be destructive of the recognition of the seriousness of the obligations imposed by contracts entered into in good faith. A problem in the evolution of collective bargaining, at the present time, is the failure of some employers, employees and union leaders to understand, and to recognize labor contract obligations. These failures have resulted, and are resulting, in work stoppages and strikes. The granting of the union demand in this case would contribute further to the belittlement of contract observance. It could constitute a precedent for future demands of the same nature by the union against these same companies. It could set a precedent for similar demands by this and other unions upon employers generally with the expectation that this board would back up those demands. It could render contracts meaningless."

Lee Pressman, CIO counsel, and Phil Murray, SWOC head, merely reiterated many times that the union was mainly interested in maintenance of uniformity of pay throughout the industry, pointing out that this was also industry practice. Mr. Murray also threatened that failure of the board to grant the CIO demand would result in "unrest, confusion, disturbances, and inequities."

## Carnegie Illinois Sets Record in Relining Furnace

Chicago

• • • The Gary works of Carnegie-Illinois Steel Corp. scored another achievement for the American steel industry this week when it set the new mark in relining a blast furnace, according to the company.

Operation of the blast furnace was resumed after a record relining time of 21 days, 3 hrs. and 50 min. The relining of the Gary furnace was from the mantle up, and the elapsed time required between the last cast of iron preceding the repair period and the first cast of the new iron production campaign was less than 22 days.

# The Thomas DUPLIKATOR

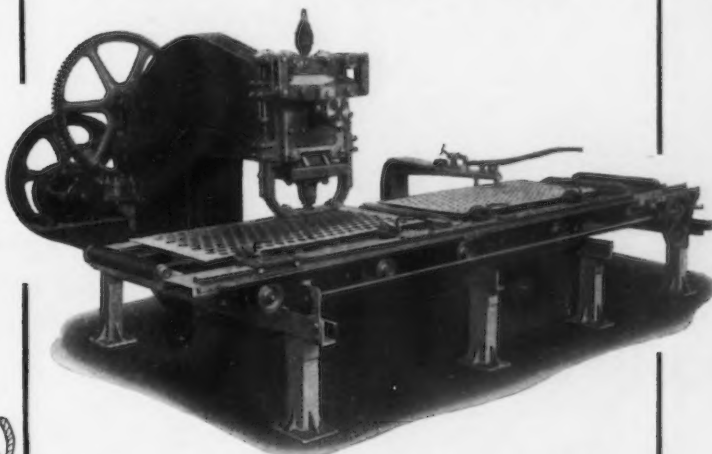


Illustration shows special machine with oscillating stripper for punching screens and similar classes of work. Standard tools can be added for regular punching.

DESIGNED AND BUILT  
BY THOMAS

THE DUPLIKATOR is an exclusive Thomas development in punching machines. Designed primarily for punching holes in plates or sheets, without the necessity of marking, and adapted to conditions where work is too small or irregular to handle on spacing table, and where multiple punching and special set-up is not required.

Its simplicity of design, ease of operation and time-saving features make the Duplikator ideal for war-time metal-punching requirements.

**THOMAS**  
MACHINE MANUFACTURING COMPANY

PITTSBURGH, PA.

PRESSES • DIES • METAL-FORMING MACHINERY

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

FABRICATING MACHINERY



## Plate Output Dominates 1942 Production Reports

• • • The record-smashing total of 5,174,000 tons of steel plates produced by the steel industry to meet the needs of the war program in the first half of this year exceeded by a wide margin the output of any other single class of steel products, according to the American Iron & Steel Institute.

Total output of steel products during the period established a

new peak of 32,684,000 tons, 5 per cent above production in the first half of 1941. Plate production rose over 90 per cent in the same period.

The tonnage of plates produced in the first six months of this year is within 17 per cent of the tonnage produced in the entire twelve months of 1941, when output of 6,200,000 tons of plates exceeded all previous records. At the rate of production in the first half of 1942, total plate production this

year will exceed the 1941 peak by almost 75 per cent.

Production of heavy structural shapes in the first six months of this year totaled 2,421,000 tons, 10 per cent above output in the corresponding 1941 period. Merchant bar production at 3,415,000 tons was 7 per cent higher; alloy steel bar output of 1,058,000 tons was up 13 per cent; concrete reinforcing bar output of 1,048,000 tons was 30 per cent higher.

Among the light products, sheet steel production between the two half-years dropped 28 per cent to 4,845,000 tons; strip steel declined 20 per cent to 1,311,000 tons, while production of wire declined slightly to 1,052,000 tons in the first half of this year.

# ARMSTRONG



## Drop Forged Wrenches

For industrial use and wherever quality counts ARMSTRONG WRENCHES are preferred for their extra strength, improved designs, finer steels, correct heat treatment, accurate openings and better balance.



Over 100 types, each in all sizes. Drop Forged Carbon and Chrome Vanadium Steel Open End and Box Socket Wrenches . . . Chrome Vanadium Detachable Head Socket and Hollow Screw Wrenches . . . Great Construction Ratchets . . . Special Wrenches of all types on short notice—standardize on "ARMSTRONG WRENCHES" they are the finest obtainable.

Write for Catalog Co-39

**ARMSTRONG BROS. TOOL CO.**

"The Tool Holder People"

309 N. Francisco Ave., Chicago, U.S.A.

Eastern Warehouse and Sales: 199 Lafayette St., N. Y.



ARMSTRONG TOOL HOLDERS Are Used in Over 95% of the Machine Shops and Tool Rooms

## Baltimore Steel Club To Meet

• • • The Steel Club of Baltimore, Inc., will hold its next regular meeting, with new officers, Sept. 11, at the Belvedere Hotel, according to C. W. Test, president. Other new officers are: J. L. Hagger, Charles T. Brandt, Inc., vice president; J. A. Malloy, Jos. T. Ryerson & Son, Inc., secretary-treasurer. New Board members include: J. A. Davis, Bethlehem Steel Co.; H. B. Dietrich, Dietrich Brothers, Inc.; S. R. Machen, Baltimore Steel Co.; J. S. McKenzie, John McKenzie & Co., Inc.; R. W. Dietrich, Rustless Iron & Steel Corp.

**80,000 BULLETS:** A six-day drive in the Bethlehem offices of Bethlehem Steel Co. yielded this pile of scrap, estimated as enough to make 80,000 machine gun bullets.



## Pittsburgh Area Scene of Some Unrest

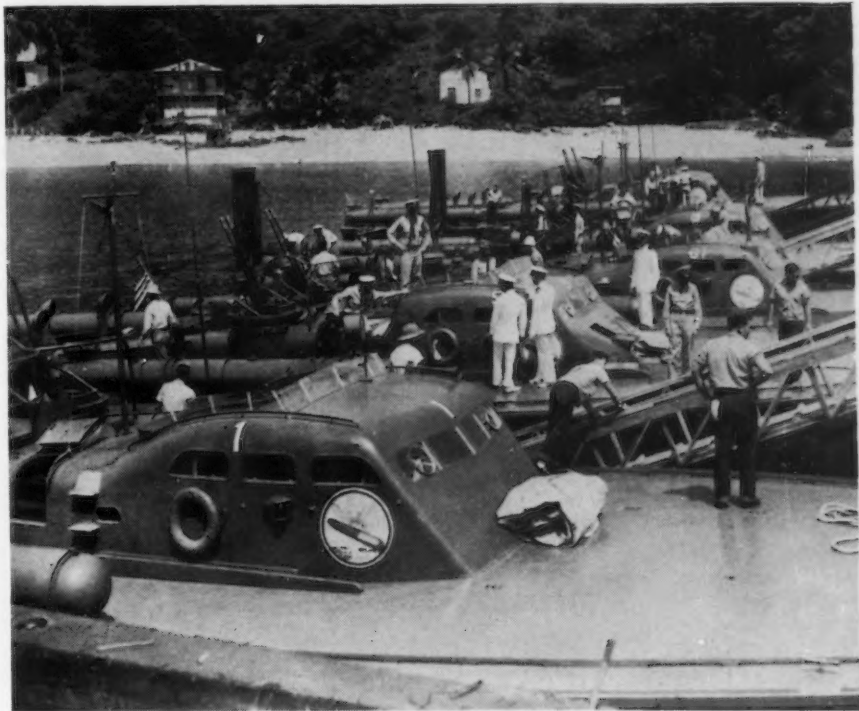
Pittsburgh

••• Pressmen and hammermen of the Crucible Steel Co.'s Midland, Pa., plant, who walked off their jobs last Saturday, returned to work Monday of this week pending mediation of their grievances. About 50 men, members of the CIO United Steel Workers, were involved.

Also returning to work the same day were 500 steel workers in the Washington Tin Plate Co., Washington, Pa. They struck Friday over a wage dispute.

Workers at the Ingles Iron Works, Verona, Pa., who struck over last weekend were to have resumed work early this week. Their contract controversy was referred to the WLB by Secretary of Labor Perkins.

Four hundred workmen in two Pittsburgh plants of the American Brake Shoe & Foundry Co. were still on strike at the beginning of the week. Their dispute has been referred to a conciliation panel.



Press Assoc. Inc. Photo

**HIGH-SPEED STINGERS ADDED:** Shown pulled up to a dock near the Pacific approach to the Panama Canal are these speedy stingers of the sea, Mosquito boats, for added protection to the canal zone.

# CONCO

3-Motor Single Girder  
CAB OR FLOOR  
OPERATED

## ELECTRIC CRANE . . .



● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.



## CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

**Builders Of Conco Torpedo Electric Hoist**

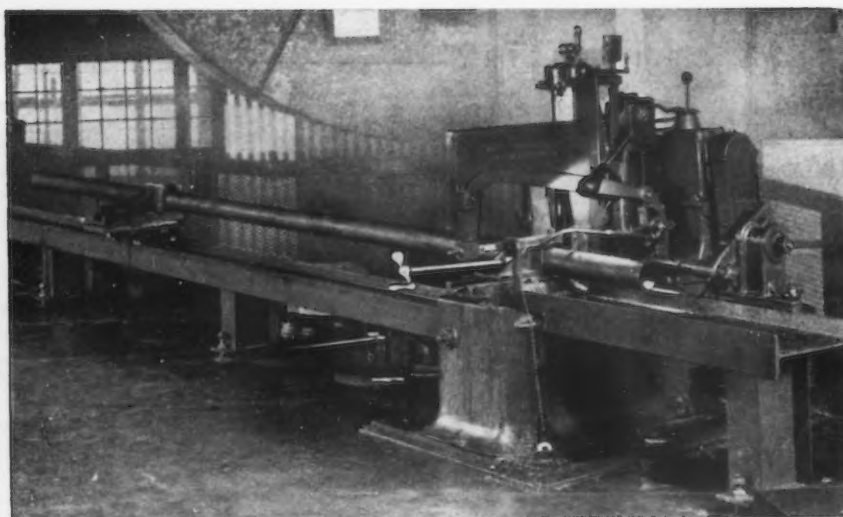
Write for Bulletin 2600C describing the Torpedo Hoist shown. Three capacities: 250 lb. — \$139.50, 500 lb. — \$149.50, 1000 lb. — \$159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

### THESE FEATURES

*Mean Faster,  
Low-Cost  
Handling!*

Motor and reducer mounted on heavy base plate . . . Gears fully enclosed, operate in oil bath . . . Floor or Cab operated . . . Mechanical or electric brake . . . Quick operation . . . Bridge extensively cross-braced . . . Hyatt Roller bearings . . . Alemite lubrication . . . Rolled steel girder . . . Drum type or Push Button controllers . . . Heat treated axles, pin and keeper type box section trucks.





## cut-off metal the economical way

The most economical method of cutting-off identical pieces from bar steel is with a MARVEL Automatic Production Saw. It will give you more pieces per hour, per machine and per dollar cost than any other accurate cutting-off method. Figured in cost per piece, it will have the lowest labor cost too, because MARVEL Automatic Saws operate with no more attention than an automatic screw machine. They keep chip loss down to a minimum and on many jobs will give you extra pieces per bar.

For fast automatic production or for single-cut miscellaneous work, MARVEL 6A or 9A Hack Saws are fast, accurate tools. Capacities 6" x 6" or 10" x 10", single or nested bars. Write today for Bulletin No. 600.



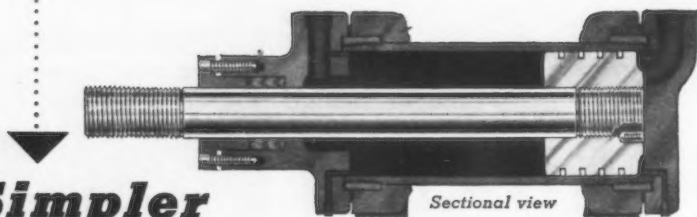
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave.

Chicago, U.S.A.

Eastern Sales Office:  
225 Lafayette St., New York



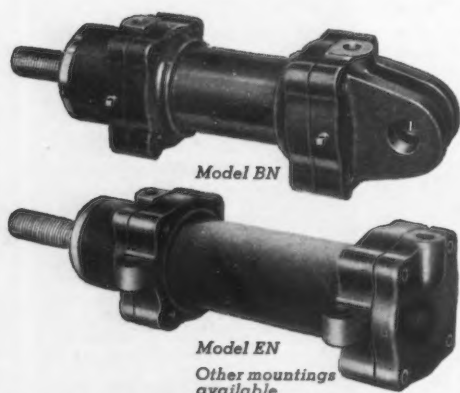
**Simpler**

## Hydraulic Power Applications

Hannifin design and precision construction of high pressure hydraulic cylinders makes hydraulic power advantages more readily available. This simple no-tie-rod design allows end caps to be removed without collapse of other parts of the assembly. End caps may be positioned independently, for convenient, economical installation. Mirror finish honing produces a straight, round, perfectly smooth cylinder bore, assuring high efficiency piston seal and minimum fluid slip.

Built in seven standard mounting types, with small diameter piston rod, 2 to 1 differential piston rod, or double end piston rod, in all sizes, for working pressures up to 1000 and 1500 lbs. sq. in. Other types built to order, any size, for any pressure. Write for Bulletin 35-A.

**HANNIFIN**  
MANUFACTURING COMPANY  
621-631 S. Kolmar Ave., Chicago, Ill.



## HANNIFIN HYDRAULIC CYLINDERS

110—THE IRON AGE, August 20, 1942

## Scrap Stockpiles Down 40% at Steel Plants, Says AISI

••• Steel mills' inventories of scrap iron and steel have shrunk approximately 40 per cent over the past 18 months, according to the American Iron and Steel Institute, and now represent an average for the entire steel industry of between two and three weeks' supply at the present rate of consumption.

Compared with the total of 3,934,000 tons of scrap on hand at American steel plants on Jan. 1, 1941, the latest figures reveal that on July 1 of this year only 2,429,000 tons of scrap were in the mills' storage yards.

The tonnage on hand at the opening of 1941 was a satisfactory stock, representing over six weeks' supply at the average rate of consumption during 1940. The shrinkage since then has put the steel industry on a hand-to-mouth basis in so far as scrap is concerned, and has prevented steel production from reaching full capacity.

Despite their inability to secure their full requirements of scrap for steel-making, steel producers have, nevertheless, been able to produce more steel in the first half of 1942 than in any previous six-month period on record. This has been accomplished by using a greater than normal proportion of pig iron in

**WHOPPERS 100% AHEAD:** These "whoppers," huge 35,500 lb. manganese bronze tanker propellers, are being produced 100 per cent ahead of schedule, according to an announcement by the Bartlett Hayward Div., Koppers Co., Baltimore. It's "thumbs-up" at this plant.



steel furnaces, and also by charging large amounts of iron ore into steel furnaces.

Reflecting emergency practices designed to maintain steel production at peak volume despite the scrap shortage, producers of open hearth steel now are consuming 580 tons of pig iron for every thousand tons of steel they produce, as against their 1941 average of using 557 tons of pig iron per thousand tons of open hearth steel. Similarly, 46 tons of iron in the form of iron ore and mill scale are now being consumed in the open hearths per thousand tons of steel produced, compared with 42 tons in 1941.

### Knox Cracks-Down on Bayonne Strike Defiance

Bayonne, N. J.

• • • Secretary of the Navy, Frank Knox, cracked-down on the striking employees of General Cable Corp. at Bayonne, N. J. The strike, a result of a wage dispute with WLB, was terminated last Friday when the Army took possession of the plant on Presidential order. Although, after seizure by the Army, the plant immediately went back in to production under Navy management, Frank Knox sent a telegram addressed to Michael Petrakian, strike leader, saying in part (the action was), "a dangerous threat to the success of our national effort in this critical emergency." Real strike-busting comment of Mr. Knox was that the Navy has too much fighting to do to be managing plants which should be operating in the American way. The telegram has been made public to counteract statements of the strikers to the effect that the plant seizure was a victory for them over management and that they were glad to work for "Uncle Sam."

Boston

• • • The S. A. Woods Machine Co., Boston, shared the lime-light this week with an impending seizure of their plant as a result of open defiance of a WLB directive order to accept membership maintenance and arbitration clauses in their contract with the C.I.O. United Electrical, Radio and Machine Workers of America. Latest word from company spokesmen indicated an adamant attitude even though a WLB deadline was promised.

## SEVEN MEN INSTEAD OF TEN

The Ransome Welding Positioner illustrated effectively positions heavy awkward pieces such as that shown. The time saved in this particular installation permits seven men to do the same amount of work ordinarily requiring ten men without the use of the Positioner. "Impossible" positions are conveniently and securely established for efficient speedy welding operations. Write for literature.

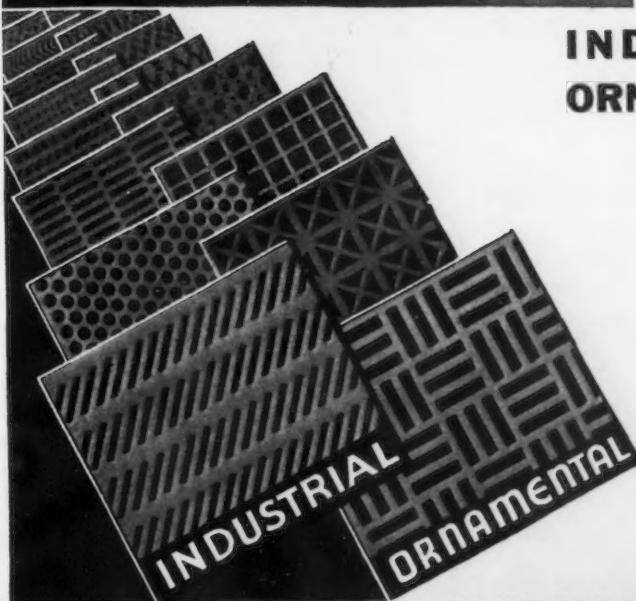


INDUSTRIAL  
DIVISION

The unit shown is one of many installed at the plant of the York Safe and Lock Company, York, Pennsylvania.

**RANSOME MACHINERY COMPANY**  
Dunellen, New Jersey

## PERFORATED METALS



INDUSTRIAL  
ORNAMENTAL

ANY METAL ANY PERFORATION

**The Harrington & King**  
PERFORATING CO.

5657 FILLMORE STREET—CHICAGO, ILL.  
New York Office, 114 Liberty Street





Signal Corps Photo

**FIRST BULL'S-EYE FOR BONDS:** Ex-Cell-O Corp., Detroit, announces the receipt of the first bull's-eye minute man flag awarded to any corporation for bond pledges exceeding 10 per cent of payroll.

• • •

**ANOTHER BULL'S-EYE:** David Nelson (center), secretary-treasurer of the Colonial Broach Co., Detroit, is shown receiving the "bull's-eye" minute man flag from Mayor E. J. Jeffries (left) for the plant's attainment of a 98 per cent bond pledge.

• • •



**72 YEARS AT SAWS:** George Metzger, 85 year old employee of Henry Disston & Sons, Inc., is being congratulated by Lt. Griffen of Tokio bombing fame, for 72 years of service and engagement in all-out war work.



### Cited for Production

#### Army-Navy Production Awards

Federal Shipbuilding & Dry Dock Co., Kearny, N. J.  
S. F. Bowser Co., Ft. Wayne, Ind.  
The Fostoria Screw Co., Fostoria, Ohio.  
Monsanto Chemical Co., St. Louis executive branch, Monsanto, Tenn., and Anniston, Ala., plants.  
Whittington Pump Co., Indianapolis, Ind.  
Hamilton Standard Propellers Div. of United Aircraft Corp., East Hartford, Conn.  
The Ohio Injector Co., Wadsworth, Ohio.  
The H. K. Porter Co., Pittsburgh, Pa.  
Abrasive Machine Tool Co., East Providence, R. I.  
Albert & J. M. Anderson Mfg. Co., Boston, Mass.  
American Locomotive Co., Schenectady, N. Y.  
Automatic Machine Products Co., Attleboro, Mass.  
Axelson Mfg. Co., Los Angeles, Cal.  
W. F. & John Barnes Co., Rockford, Ill.  
Bell Aircraft Corp., Buffalo, Niagara Falls.  
Borg-Warner Corp. (spring division), Bellwood, Ill.  
Bryant Chucking Grinder Co., Springfield, Vt.  
Builders Iron Foundry, Providence, R. I.  
Carlton Machine Tool Co., Cincinnati, Ohio.  
Cone Automatic Machine Co., Inc., Windsor, Vt.  
Continental Motors Corp. (Detroit Plant), Detroit.  
Curtiss-Wright Corp., Airplane Division, Plants Nos. 1 & 2, Buffalo.  
Fellows Gear Shaper Co., Springfield, Vt.  
Firestone Rubber & Latex Products Co., Fall River, Mass.  
Gisholt Machine Co., Madison, Wis.  
Jones & Lamson Machine Co., Springfield, Vt.  
Landis Tool Co., Waynesboro, Pa.  
Levingston Shipbuilding Co., Orange, Texas.  
Skinner Engine Co., Erie, Pa.  
A. O. Smith Co., Milwaukee, Wis.  
Wright Aeronautical Corp., Lockland, Ohio, and Paterson, N. J.  
Crawford-Austin Mfg. Co., Waco, Texas.  
Eastman Kodak Co. (Kodak Park. Camera and Hawk-Eye works and Eastman Office), Rochester, N. Y.  
Erie City Iron Works, Erie, Pa.  
Gilbert & Barker Mfg. Co., West Springfield, Mass.  
Gleason Works, Rochester, N. Y.  
Humble Oil and Refining Co. (Baytown ordnance works), Baytown, Texas.

## New Appeal Procedure for Relief from M and L Orders

New York

••• A new method of handling appeals from M and L orders will soon be adopted by the WPB. This was disclosed in an address, delivered here last week by Arthur L. Harris, assistant chief of the Bureau of Priorities, to a group of business men at a three-day WPB regional meeting.

Adequate information is vital to the successful analysis of an appeal, Mr. Harris stated. "Therefore, instead of having appeals made to the War Production Board in letter form, or filed in a miscellaneous manner, we shall shortly have appeals from clearly specified orders filed the same as under Order M-126, in the field office of the War Production Board nearest to the appellant. This is for the purpose of gathering complete information concerning the appellant's business by those most familiar with the person's circumstances and surroundings in that community.

"This program will be integrated with the disposal of idle inventories, which may appear as the result of the denial of an appeal. Nevertheless, the primary reason for this is to put the appellants in touch with their nearest WPB field office for the purpose of gathering information concerning the appeal." Highlights of Harris' talk follow:

"Appeals from designated orders will be filed where possible on a standard form that covers many orders, or by letter filed in triplicate. The decision on appeals will continue to be the responsibility of the WPB in Washington. Close contact will be kept with the field office so that the appellant will be kept informed as to the outcome of his problems. It is hoped that making this service available to the business men throughout the United States will be mutually beneficial.

"At this point let me state that it is the policy of the War Production Board and has been for many months to see that where a Branch has denied an appeal, recourse is available to the appellant to an impartial review by a disinterested group. An Appeals Board has been formed for this purpose, and it is

the responsibility of this portion of the Division of Priorities to be certain that injustice is done to none. Nevertheless, it is to be remembered that primarily the granting of appeals is only for the purpose of furthering the war program.

"In considering the merits of an appeal from a manufacturer desirous of completing the assembly of inventory on hand, many factors are taken into consideration:

"The policy adopted by WPB will govern decisions on appeals to assemble processed or semi-processed inventories beyond cut-off dates or in excess of limitation quotas. In general, such appeals will not be granted except when the materials have already been fabricated to such an extent that their use as scrap would be grossly wasteful.

"The granting of appeals will be considered only after it has been determined that no other adequate relief is available to the applicant. Relief available in many cases without granting an appeal from the terms of a WPB Order includes:

"(1) Assistance in disposal of frozen inventory materials to other companies permitted to use them, or to Government agencies;

"(2) Resale to the source of supply.

"(3) Assistance in securing war orders or in conversion of facilities to direct war production.

"(4) Advice on obtaining financial assistance from the Bureau of Finance in the Division of Industry Operations.

"(5) Assistance in the disposal of idle production equipment.

"Before filing an appeal under an order, any company which considers itself subjected to undue hardships should consult with the nearest WPB field office to find out whether any of the forms of assistance outlined above will solve its difficulties.

"When an appeal is filed in proper form for permission to assemble processed inventories in excess of Limitation or Conservation Orders, no such appeal will be granted unless:

"(a) The amount of unprocessed critical material is exceptionally small.

"(b) The following tests are met:

"(1) The processed inventory must be without salvage or reclaim value to war production, and, if not assembled, must have small group value, compared to the worth of the completed item.

"(2) The appellant must not be in violation of existing Conservation, Limitation or Priorities Orders.

"(3) The appellant must not have purposely processed a large inventory with the view of requesting preferential treatment or have otherwise violated the spirit of the order from whose terms he is appealing.

"(4) The labor to be employed for the assembling of the inventory will thus be trained for war work, or, if this is not the case, the labor so used will not be required immediately for war production.

"(5) The plant facilities used for assembling processed inventory are not needed for immediate war production.

"(6) The granting of the appeal will help finance conversion to war work, or,

if this is not the case, the granting of the appeal will relieve the appellant's financial stress and in no way interfere with the war effort.

"(7) The granting of the appeal will not give the appellant a substantial advantage over competitors in a like situation.

"(8) No permission will be granted to use or procure materials which are very scarce, such as nickel and tungsten, except when the amount is extraordinarily small and the article manufactured will have an unusually large value to the national economy.

"Primarily, appeals will be granted only if the successful prosecution of the war is furthered thereby. However, there may be certain appeals for relief where to deny the appeal would injure civilian economy without corresponding benefit to the war effort. In those instances the tests above will be treated as the basic points to be taken into consideration in determining whether or not to grant the appeal.

"I once practiced the tax law myself, and there was a certain sporting flavor in advising clients what could be done within the law as contrasted to tax evasion. I must admit that some of the Treasury boys saw to it that these loopholes were properly plugged in the subsequent tax bill, but it was 'all in the game.'

"There is no distinction in fact, however, between priority order avoidance or evasion. In either case the loophole cannot be plugged the following year. The metals must be saved now! Next year's diligence will not replace the bullets, tanks and airplanes we need today. And so criminal prosecution and suspension orders fall short of the answer. What we of the War Production Board need is your cooperation and teamwork."

### Machine Tool Allocations

••• Preference Order E-1-b, controlling producer's monthly machine tool deliveries, was amended on Aug. 13 to provide for reallocation of tools after one group or class of service purchasers has failed to order its full quota. Any surplus in the hands of the manufacturer caused by this condition is to be disposed of to the group of service purchasers which has the greatest backlog of orders on the producer's books in proportion to the number of tools to which the group is entitled under its quota.

December is the first month to which the new system is to be applied; schedules for the intervening months are unaffected.



The effect of the amendment is to do away with the present practice of releasing surplus machine tools to other service purchasers on the basis of their urgency standings.

### Steel Mill Supplies, Repairs

••• Ratings of AA-3 may be applied for maintenance, operating or repair supplies for iron and steel mills, WPB announced on Aug. 10 in Amendment No. 4 to Order P-68. This rating applies to operating supplies consisting of iron or steel in any form appearing on Metals List No. 1, revised, of form PD-25A. A-1-a ratings may be applied to non-ferrous metals appearing on the list, or to fabricated metal parts. A-1-c ratings are granted for all other operating material.

In case of actual breakdown of a steel mill, the WPB states that whatever rating is necessary to obtain the needed parts may be applied by the Director General. It is understood that breakdown cases will actually be granted an AAA, the rating now applied to mine breakdowns.

### WPB Investigating Compliance with Order M-126

••• A check into the operations of manufacturing users of iron and steel who are subject to General Conservation Order M-126 is being carried out by the Compliance Branch of the War Production Board. Using its own investigators, WPB is surveying several hundred firms in a program to determine the extent of compliance with the restrictions placed around these "back-bone" materials of the war effort.

### Eastman Orders Maximum Loading of Freight Cars

Washington

••• To bring about a more efficient utilization of railroad freight cars and locomotives, Joseph B. Eastman, Director of Defense Transportation, last week issued a general order requiring the maximum loading of cars carrying civilian freight.

The order (General Order No. 18), which becomes effective September 15, prohibits railroads from accepting for shipment, with certain exceptions, any freight cars

which are not loaded either to their marked load limit or to their full visible capacity.

Tank cars, flat cars, and cars containing less-than-carload freight are excluded from the order's provisions.

In an explanatory statement accompanying the order, Mr. Eastman pointed out that conservation not only of cars, but of locomotives, is of utmost importance, and this conservation could best be served by issuance of the order.

Pointing to the limited stock of critical materials, Mr. Eastman said we must get the greatest possible use out of the existing railroad plants. He added, however, that the order will not avoid the need for additional cars and locomotives, but it will lessen that need and afford shippers substantial insurance against shortages.

### Power and Light Projects Halted

••• Because of the increasing need for conservation of copper and steel, the WPB on Aug. 13 halted construction on power and light projects which had been permitted under prior authorization if they were 40 per cent complete on Dec. 5, 1941. The action, taken through issuance of Amendment No. 3 to Order P-46, does not affect construction of vital war projects which have been or may be specifically authorized by WPB. The new amendment, which applies to public and private utilities alike, has the effect of stopping all construction in this field. REA projects were already halted on July 20.

### Airline Supplies

••• The preference rating for materials necessary for maintenance and repair of airline aircraft was raised Aug. 12 by the WPB from A-1-j to A-1-a. The action was taken in Amendment No. 2 to Preference Rating Order P-47.

### Steam Surface Condenser Tubes

••• The use of less critical material in tubing and tube sheets for steam surface condensers used in land installations of power generating equipment was ordered in Schedule II to Order L-154 issued by WPB Aug. 14. It is estimated

that the order will result in an annual saving of 50 tons of nickel, 164 tons of copper and 9 tons of aluminum.

The order prohibits the use of copper, copper base alloy, nickel or tin in tube sheets.

### Remelting Zinc Plates

Washington

••• WPB said last Friday that if newspapers and photo-engravers follow a plan recently worked out by WPB and industry representatives to segregate zinc plates after publication and remelt them for reuse, they can get by without using more than 10 or 15 per cent of what they now consume. A recent WPB order limited the industry to the use of 50 per cent of the amount of zinc it used in the corresponding quarter of 1941.

### Thermoplastics Controlled

••• An illustration of the speed with which military production is taking available supplies of materials was provided last week by action of the Director General for Operations in regard to thermoplastics.

M-154, which set up a ladder of uses for thermoplastics was issued on June 27, and provided for scheduling of operations by manufacturers to begin on July 15. That later was postponed until Aug. 15 to give manufacturers time to change operation schedules.

So greatly has military demand risen in the meantime that M-154 no longer provides proper control for all types of thermoplastics.

The amendment changes the order to a limitations order and extends the date for scheduling until Oct. 1, pending revision of thermoplastics control which will take into account the altered conditions in demand.

Issued at the same time were two supplementary orders, M-154-a and M-154-b.

M-154-a restricts the use of polyvinyl butyral, a rubber substitute, to war orders, except by special authorization of the director general.

M-154-b provides that methyl methacrylate sheet scrap cannot be disposed of except to re-process into sheeting. The material is widely used for gun turrets and navigators' domes in military aircraft.

(TURN TO PAGE 116, PLEASE)

## Hand Drawn Coke Producers, with Coal Being Received by Truck, Granted Relief

Washington

••• In order to avert a threatened shortage of beehive oven coke produced in Pennsylvania, Price Administrator Henderson has ordered an upward revision on prices that certain high-cost producers may charge.

The revision was made in Amendment No. 2 to Revised Price Schedule No. 77. It raises the price for marginal producers from \$6 per ton f.o.b. Connelsville, Pa., to \$6.50 per ton.

In order to qualify for the increase according to the amendment, operations must involve hand-drawn ovens, and the total coal supply for such hand-drawn ovens must necessarily be trucked from the mine to the ovens. The seller must also file with OPA, within seven days after first charging the higher price, an affidavit stating the name, ownership, size and average monthly production of the operation, whether part or all of the ovens are hand-drawn, the distance and place from which the coal must be trucked and whether all of the coal is so trucked.

Mr. Henderson explained that increases in coal prices and trucking rates have cut seriously into the margins of some producers and have forced other plants to operate at a loss. A curtailment of output was definitely threatened, he said.

Hand-drawn plants trucking in the total of their coal requirements were most seriously threatened, according to a recent survey of the region. Cost increases for these producers, the Price Administrator pointed out, necessitated the increase of 50c. per ton.

In addition to averting the threatened shortage by keeping these plants in operation, he said, the increase in prices may be expected to bring about increases in production through the rehabilitation of abandoned ovens.

"There are still ovens available for rehabilitation," Mr. Henderson said, "and producers have indicated their willingness to bring them into blast if a price increase were

permitted to offset the cost of rebuilding."

Another section of the order establishes a ceiling on commissions for the sale of beehive oven furnace coke produced in Pennsylvania. The Price Administrator stated that the pressure on the ceiling price caused by other cost increases made essential the stabilization of this important cost item. A maximum charge of 25c. per ton for commissions for brokerage fees was adjudged to be fair and reasonable.

### More Than 2000 Beehive Coke Ovens Affected

Pittsburgh

••• More than 2000 hand drawn coke ovens in western Pennsylvania which receive their coal by truck will be affected by the increase in the ceiling price of beehive coke for certain plants. For several months between 400 and 500 ovens have been out of production because they could not operate under the \$6 ceiling price. Observers here have pointed out for months that unless these marginal producers were granted relief coke production vital to pig iron output would be threatened. The current move was outlined as a necessity in THE IRON AGE several months ago. It is said that if the present change had not been made it was entirely possible that close to 1000 additional coke ovens would have shut down.

The level established for brokers' fees really means a decrease for the brokers as they had been obtaining in many cases 6 per cent of the contract price which amounts to 36 cents on a \$6.00 ceiling and 39 cents on a \$6.50 a ton ceiling. Now that 25 cents a ton has been set the difference will go to the producer.

It is pointed out here that the placing of the hand drawn, truck serviced coke ovens are now definitely in the marginal class and if demand for coke falls off the consumers will of course insist on machine drawn coke which sells for 50 cents a ton less. This would mean that the marginal plants af-

fected by the new ceiling price change will be able to be operated only when demand is at its peak unless they operate at a loss.

At present supplies are not as tight as they were a few weeks ago due to one merchant stock being down here. Coke for that stock is being diverted to other plants.

### Coking Coal Hauling Rates Set

Washington

••• Recognizing substantial increases in operating costs since March, resulting from wage increases approved by WLB and changes in load capacity, OPA on Aug. 10 established maximum rates on a mileage basis for trucks hauling coal from mines to beehive coke ovens in Fayette, Greene and Westmoreland counties, Pa. The rates are contained in amendment No. 5 to supplementary regulation No. 14 and sets the maximum charge per ton for hauls up to 25 miles in the three counties from mines to beehive coke ovens and to barges on the Monongahela River or to rail cars as follows: 10c. per mile for the first two miles; 6c. per mile for the next three miles; and 5c. per mile thereafter.

The following special charges, conforming to March practices, are allowed: 5c. a net ton additional for coal transported from stripping plants and 2c. per net ton additional for accessorial services performed on contracts under which the contracting motor carrier operator assumes responsibility for the entire movement of the coal and supervises all trucks performing the transportation.

### Nickle Anode Price Fixed

••• The maximum price of 46c. a lb., without hooks, f.o.b. seller's place of business for new nickel anodes and a price of 43c. a lb. for partly used anodes was fixed by OPA on Aug. 11. These prices apply if a dealer is unable to determine a maximum price under section 1499.2 of GMPR. These prices are established in order No. 56 under section 1499.3 (B) of GMPR, effective Aug. 13. When sold for scrap instead of nickel plating purposes, anodes must be priced under the provision of price schedule No. 8. WPB plans to make available for war use the stocks of new and partly used nickel anodes held



by platers and frozen by order M-6-B, OPA said.

### Granite City Steel Gets Relief

• • • Granite City Steel Co., Granite City, Ill., has been granted permission to charge the maximum Chicago basing point price, f.o.b. Granite City, on 5500 gross tons of plain carbon steel slabs for Lend-Lease shipment allocated by the WPB for third quarter delivery to Eastern Seaboard points.

Authorization is contained in order No. 17 under Revised Price Schedule No. 6 on iron and steel products, and became effective Aug. 13, 1942.

### Adjustments on Some Pig Iron All-Rail Shipments

• • • An amendment incorporating into Revised Price Schedule No. 10 on pig iron a new method of adjusting delivered pig iron prices on shipments from Buffalo when made by rail to points to which shipments before the war moved by barge or barge and rail, was announced last week by OPA.

The measure—titled Amendment No. 2 to Revised Price Schedule No. 10—becomes effective Aug. 21.

The amendment is made necessary because of the burden placed upon the seller of paying the all-rail freight from Buffalo in cases where barge shipments are not feasible.

It provides a pricing formula under which a seller of pig iron in the Buffalo area using rail instead of barge arrives at his maximum price by taking the sum of:

1. The basing point price at the governing basing point;
2. Any allowable differentials;
3. The usual transportation charges from the basing point to the point of delivery; and
4. The amount by which the all-rail freight rate exceeds the charges for barge or barge and rail transportation to the place of delivery.

Differences between the charges for all-rail transportation and the charges for barge or barge-rail transportation from Buffalo to the place of delivery must be calculated at the established rates in effect during the barge shipping season of 1941.

### OPA Hampers War Production Representative, Harter Charges

Washington

• • • Charges were made in the House last week that OPA was hampering production of planes for the armed forces. Representative Dow W. Harter, chairman, special House committee, investigating the aviation program, introduced a bill last week to prohibit price control of equipment which only the government buys for war purposes.

In recent months, Representative Harter said, the OPA has sought to impose a price-fixing formula and maximum prices in the aircraft industry and on those supplying strictly the implements of war. This Representative Harter said was a violation of an understanding, entered into when the Price Control Act was under consideration, to the effect that there would be no ceilings established over combat material, though the material that went into it would be subject to controls.

It was said the Under-Secretaries of War and Navy had no objection to price ceilings or maximum price regulation of items which the armed forces bought and which were also bought by the civilian population but they held that to put combatant material of which the government was sole buyer under price regulation would retard the war effort.

### Priorities

(CONTINUED FROM PAGE 114)

### WPB Moves to Eliminate All Unauthorized Data Requests

• • • In an address last week before the Society for the Advancement of Management, Joseph I. Lubin, chairman of the WPB Committee for the Review of Data Requests from Industry, stated that effective steps have been taken to eliminate "bootleg" or unauthorized data requests, including those sent out by telegraph.

Since July 1, all new forms and reprints of old forms have been standardized in format and the size reduced so that they can be used in a standard carriage typewriter.

A number of specific cases of duplication reported by industry have been eliminated. In some instances, telegrams have been sent to

respondents advising them to discontinue the filing of a questionnaire, such as Cadmium Form PD-442; and other forms, such as PD-99, 138, and 139 have been combined. Pending the complete revision of all forms, individual questions have been eliminated from some forms and respondents advised accordingly.

Recently, representatives of the chemical industry were asked to review a new proposed standardized form which, after several meetings, was unanimously approved both by industry and WPB. It will be used instead of individual forms for future allocations of chemicals, and will gradually replace forms now in use for this purpose.

As the forms used by each branch are reviewed, experts from the industry affected are being called in as advisors and their recommendations adopted whenever possible.

Mr. Lubin pointed out, however, that it is inevitable that new forms will have to be issued occasionally as additional materials become critical and their control essential to the war program, but the information required will be reduced to a minimum.

### Kitchen Utensils

• • • Amendment No. 6 to Order L-30, reduced the use of iron and steel in the manufacture of kitchen utensils. It provides that during the Aug. 1-Sept. 30 period iron and steel needed in the manufacture of cooking utensils may be used at 70 per cent of the rate of use during the 12 months ended June 30, 1941. During the August - September period iron and steel may be used in a second group of products, consisting mainly of kitchen ware and essential household articles, at a 50 per cent rate.

### Rubber Covered Rolls

• • • Specifications for the manufacture of rubber-covered rolls used in the steel, paper, textile, tanning and other industries were issued by WPB last Saturday to save an estimated 25,000 lb. of rubber a month. The specifications, Amendment No. 15 to Order M-15-b-1, require the use of less rubber in compounds for rubber-covered rolls. Washing machine, printer, fingerprint and business machine rolls are not covered by the amendment.

## This Week's Priorities and Prices

**Steel mill maintenance**, operating and repair supplies are granted an AA-3 rating by Amendment No. 4 to order P-68. Breakdowns receive higher ratings (T-708)

**Mines** have been granted AAA ratings for repairs of breakdowns by Amendment No. 3 to amended order P-56. (T-707)

**Machine tools** not purchased by one group of service purchasers are to be delivered to the other service group having largest backlog of unfilled orders by amendment to order E-1-b. (T-726)

**Airline aircraft materials** for maintenance and repair are granted A-1-a ratings in place of A-1-J, by Amendment No. 2 to Order P-47. (T-717)

**Construction of light and power projects**, except those vital to the war, was halted by Amendment No. 3 to Order P-56. This stops work on projects previously authorized if 40 per cent complete on Dec. 5, 1941. (WPB-1694)

**Nickel anode prices** for other than wholesalers or retailers are set by Order 56 under Sec. 1499.3 (b) effective Aug. 13. (OPA-T-42)

**Beehive coke prices** charged by marginal producers were raised to \$6.50 a ton, f.o.b. Connelsville, Pa., by Amendment No. 2 to Revised Price Schedule No. 77. (OPA-527)

**Brass and bronze alloy ingot prices** were reduced approximately 1.20c. per lb. by a new maximum price regulation, No. 202, which became effective Aug. 19. (OPA-508)

**Special gages** manufactured pursuant to customer's drawings have been placed on a March, 1942, base date by Amendment No. 3 to Maximum Price Regulation 136. (OPA-505)

**Aluminum ingots** and practically all grades of aluminum scrap are covered in a revision of Price Schedule No. 3. (OPA-510)

**Iron and steel** used in the manufacture of kitchen utensils is further reduced in Amendment No. 6 to Order L-30 issued Aug. 15. (WPB-1710)

**Pipe fittings** necessary for the manufacture of drain pipes and fire sprinkler systems are added to the list of permitted products in Schedule II of Order L-42 by Amendment No. 3 issued Aug. 15. (T-730)

**Steam surface condenser builders** are ordered to use less critical metals in their products intended for land installations by Schedule II of Order L-154 issued Aug. 14. (T-732)

**Pig iron producers** shipping by rail from Buffalo are granted a new pricing formula by Amendment No. 2 to revised Price Schedule No. 10, effective Aug. 21. (OPA-521)

**Thermoplastics control** was tightened Aug. 14 by changing M-154 to a limitations order pending revision of the setup in view of increased demand. (WPB-1701)

■ ■ ■

*For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)*

o o o

## Revisions to The Iron Age Priorities Guide

● ● ● The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of June 4 to bring the Guide up to date.

Under "M Orders," page 6, add:

**M-15-b...**Amendment No. 12 (8-5-42) requires written approval of WPB for regrooving of tires.

**M-53...**Amendment No. 1 (8-13-42) permits use of orange mineral (lead oxide) in printing ink.

**M-110...**Amended order provides that molybdenum may be melted only after approval of melting schedules as provided in order M-21-b or by specific authorization (8-8-42).

**M-154...**Amendment No. 2 (8-14-42) deals with thermoplastics for military production.

**M-189...**Chlorinated paraffin placed under complete allocation (8-10-42).

Under "P Orders," page 13, add:

**P-46...**Amendment No. 3 (8-13-42) stops construction of power and light projects to conserve copper and steel. Specific exceptions may be issued.

**P-47...**Amendment No. 2 (8-12-42) raises preference ratings for airline, aircraft maintenance and repair to A-1-a.

**P-56...**Amendment No. 3 (8-8-42) provides for issuance of high ratings in event of mine breakdowns.

**P-68...**Amendment No. 4 (8-10-42) permits application of AA-3 ratings for steel mill maintenance, operating and repair supplies.

**P-84...**Amendment No. 1 (8-11-42) provides preference rating assistance for repair and maintenance.

**P-98...**Reissued 8-13-42. Expires 9-15-42.

Under "L Orders," page 19, add:

**L-41-b...**Restrictions on non-essential construction do not apply to conversion installations begun before Jan. 1, 1943, in certain states (8-10-42).

**L-63...**Reissued 8-13-42 to combine various amendments and exemptions.

**L-70...**Amendment No. 1 to amended order (8-14-42) orders maintenance of reserve supplies of gasoline for service stations in Oregon and Washington.

**L-79...**Amendments No. 1 and 2 (8-11-42) state that cooking equipment is subject to the terms of this order.

**L-154...**Schedule II orders use of less critical material in tubing and tube sheets for steam surface condensers. Effective 8-19-42.

Under "Priority Regulations," page 33, add:

**Priorities Regulation No. 1...**Amendment No. 4 (8-11-42) changes the order of ratings in the AA series.

**Priorities Regulation No. 12...**Revised regulation sets up new procedures for applying high ratings (8-11-42).

Under "E Orders," page 32, add:

**E-1-b...**Interpretation No. 4 (8-10-42) advises machine tool producers that an urgency standing-should not be used in connection with a PD-1a.

**E-1-b...**Amended order provides for reallocation of tools after certain quotas have been filled (8-13-42).



## Black Market In Steel Found Not So Black

Washington

•••The black market in steel was not so black as it had been painted.

Confined wholly to the warehouse situation, a report was made public on Monday by the WPB Compliance Branch. The investigation was made as the result of testimony given recently before a sub-committee of the House Merchant Marine and Fisheries Committee at New Orleans by Frank Higgins, president of Higgins Industries, Inc., New Orleans, who indicated that his firm had been able to buy steel products in the black market.

The report drew two conclusions:

No evidence was developed to show directly that steel products had been shipped to the Higgins company in violation of WPB orders;

However, there is evidence to indicate that some steel warehouses, in addition to the 22 penalized last spring in other cases, may have violated WPB quota regulations.

The Compliance Branch said that as a result of the latter indication it is intensifying its current warehouse survey to ascertain all the facts and that if any additional violations are uncovered, punitive action will be taken against the violators.

Mr. Higgins told the sub-committee that there existed a "black market" for iron and steel products and that warehouses of the country were bulging with all types of steel which could be obtained by paying a price above the OPA ceiling.

The investigation of the charges was made beginning on Aug. 5 at New Orleans by H. J. Dowd, chief of the WPB Investigation Section, and James O. Moore, Jr., of WPB Legal Division. On July 18 the Maritime Commission canceled a contract with the Higgins company for the construction of the shipyard and 200 Liberty ships. The commission said the cancellation was due to the shortage of ship plates and also because the additional facilities were no longer necessary in the Liberty ship program. In the course of his testimony before the Truman Senate

Committee Investigating National Defense, Mr. Higgins claimed that there was no shortage of steel and that plenty of steel was available on the market, and referred to the black market. Later he testified before the House sub-committee, headed by Representative Pedersen, at New Orleans which took testimony concerning the cancellation of the contract and again referred to "black market" operations.

Representatives of WPB, OPA and the Department of Justice held conferences with Andrew J. Higgins, Andrew J. Higgins, Jr., and Frank Higgins at which the Higginses submitted copies of all invoices and correspondence which they had produced before the Pedersen Committee in support of their charges. Upon being questioned, the report said, they all agreed that the term "black market" had been used ill-advisedly. In making use of the term "black market," Frank Higgins said, according to the report, that he meant there is now and has been for some time, available to the Higgins Industries, Inc., a supply of various iron and steel products.

Continuing, the report said:

"This steel is offered to Higgins Industries, Inc., and other consumers by salesmen representing steel warehouses. Several lists containing such offers were supplied to the investigators. All of these offers stipulated that orders must be placed in less-than-carload lots (40,000 lb.), and the steel was priced at the l.c.l. price prescribed by Price Schedule No. 49, which is considerably higher than the mill price set in Price Schedule No. 6.

"Frank Higgins also stated that Higgins Industries, Inc., was unable to obtain prompt deliveries by placing their steel orders directly with the mills, and they were thus forced to split their orders and purchase through warehouses at the higher prices. Because of the fact that there has always been a supply of steel available through such resources at higher prices, Frank Higgins had made the charge that this constituted a 'black market' operation."

The report also cited evidence given by Andrew Higgins, Jr., and Andrew Higgins concerning the placing of orders for steel, priorities and other matters.

The report then concludes:

"Excluding possible violations of the price schedules prescribed by the OPA, the statements and information submitted by Higgins to representatives of the War Production Board and the other agencies participating offer no evidence of 'black market' operations as the term is commonly understood in this country and in England. Higgins presented no evidence that scarce material has been diverted from the war program, and all of the deliveries cited by Higgins were made pursuant to high-rated defense orders.

"It is true that certain of these deliveries appear to have been made at prices in excess of the OPA schedule for warehouse sales, and others appear to have been an evasion of the OPA regulations for the purpose of obtaining the l.c.l. or warehouse price. These possible violations are outside the jurisdiction of the War Production Board, and are presently being investigated by the Office of Price Administration.

"No evidence has been submitted by Higgins of violations of the orders and regulations of the War Production Board. There are, however, three types of possible violations which may be developed as a result of the investigation now being undertaken by the Compliance Branch.

"(a) Warehouse Quota Violations — Supplementary Order M-21-b prescribes a quota for all steel warehouses and prohibits any such warehouses from receiving steel in excess of its quota.

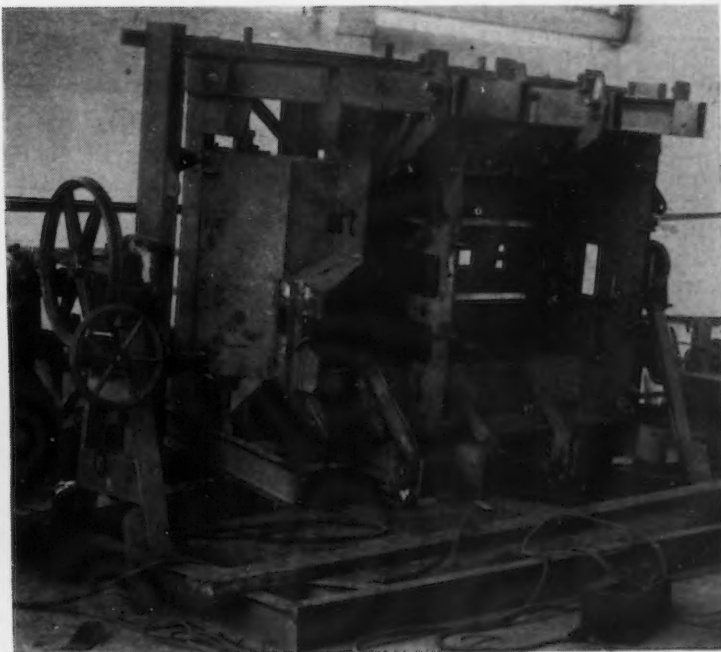
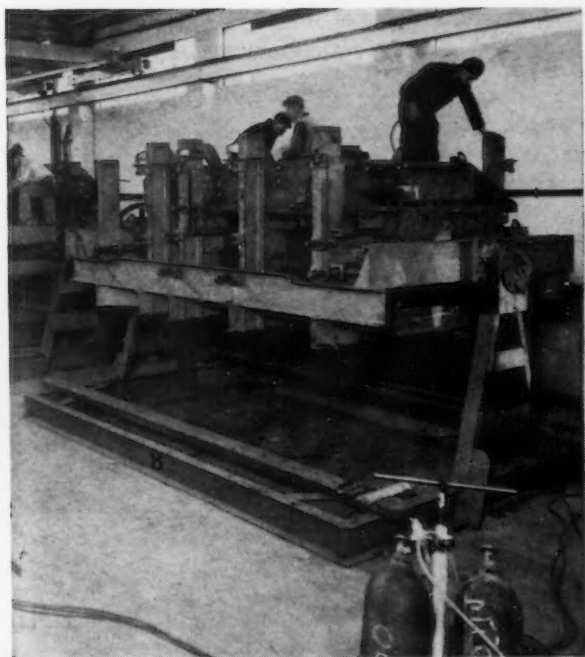
"(b) Shipments of Greater than Carload Lots—Supplementary Order M-21-b, as amended May 4, 1942, provides that 'no warehouse shall make a delivery to any one customer to one destination at any one time from warehouse stock in quantities representing a minimum carload or more, except on specific approval of the War Production Board.'

"(c) Referring to Deliveries to Warehouses over Other Consumers — Higgins stated that his company was always able to obtain its steel requirements promptly from warehouses at l.c.l. prices, but was unable to place a mill order for steel and obtain a reasonable delivery date. This charge carries with it an inference that deliveries to steel warehouses have been preferred by steel producers.

## Australia Produces With Much Improvising



• • • Australia, a huge country with a population about that of Metropolitan New York, has for years been remarkably ingenious industrially. On the left is a forging press finishing a gun barrel. The 2000-ton press was made in Australia, and a typical Australian touch is the neat board in the background for tools. Steel plants in that country are neater and cleaner than any other in the world. Below are Bren gun carrier hulls being welded in jigs. The jigs rotate by worm and wheel, and provision is made for clamping major plate sections into position before welding. These jigs represent practice fully as advanced as that in the U. S.





## Washington

(CONCLUDED FROM PAGE 72)

the exhibit introduced by Reese H. Taylor, WPB Iron and Steel Branch Chief, on his very subject. The Iron and Steel Branch had determined several months back that the priorities system was not working to keep the steel program in balance, and therefore adopted the quota Assignment System to direct the production of all steel products. The exhibit follows:

1. The primary policy shall be to endeavor to schedule a non-integrated steel producer at approximately the same rate of operation as the integrated producers who make the same product.

2. Every effort should be made in the case of the non-integrated producer (and the integrated producer also) to schedule an operation which will permit reasonable employment for at least one shift. If, however, the demand for the production in question is so light that such employment is not possible, you are to submit full facts to me before taking any action which would cause the shutdown of a non-integrated producer.

3. Production directives issued to non-integrated producers should be supported by specific allocation of the semi-finished steel to integrated producers. Such production directives and allocations should provide that the non-integrated producer shall not purchase any additional steel over the quantity allocated.

There are only about four non-integrated companies operating now, making a cupful of light steel, about 130,000 tons.

**HENRY J. LANDAHL**, secretary-treasurer of the Pacific American Iron & Steel Corp., made the headlines when he told the committee that the "Morgan-United States Steel interests" had blocked loans sufficient to develop coal and iron in the States of Washington, British Columbia and in lower California.

He said that his company had on file with the RFC an application for a loan of \$50,000,000 for the purpose of erecting a blast furnace for the production of pig iron, with a daily capacity of 1000 tons, and a steel plant of 550,000 to 600,000 tons.

"On the 5th inst. we filed an application for the loan of \$50,000,000 with the Reconstruction Finance Corporation, said Mr. Landahl.

"We realize how futile this step was, as the Hon. Jesse Jones will naturally consult with the dollar-a-year men from the Morgan-United States Steel Corporation that surround him, men such as Conover who blacked out your Committee's iron and steel inquiry in Seattle, Washington, August, 1941."

Mr. Landahl said that his company was the outgrowth of previous activities over a period of nearly 50 years to have iron and steel production started on the Pacific coast by the Tacoma Steel Co., Washing-

ton, British Columbia Steel Corp., Hewitt Steel Corp., Coast Range Steel Ltd., and B. C. Furnaces, Ltd., and that all of these companies were stopped by the Morgan-United States Steel Corp. groups from securing the required finances. Part of Mr. Landahl's testimony on this point follows:

"We were stopped, however, when it came to finance. Wherever we went, we encountered the Morgan-United States Steel Corp. forces and these had the power to prevent every private and government source from handing us the funds pledged us in written, signed undertakings. Governments, iron and steel operators, financiers, singly and in groups, pledged finance to us for the project I had in hand; each was forced to back out, through one method of evasive action or another, a series of performances that rival Hitler's best.

"The actual cost to us of engineering and finance negotiations is over \$675,000. The cost in developing and in taxes runs into many millions of dollars. The cost in wrecked and ruined lives—that is impossible to estimate."

If Mr. Landahl has in his possession evidence to substantiate his statements, there are laws in this country to recompense the wrongs he claims his interests have suffered. Thurman Arnold's Anti-trust Division would be interested. Courts of equity grant injunctions to prevent malicious interference with the contractual relationship, and enforce specific performance of contracts. Courts of law give damages for the breach of contract, and for interference with business relations and prospects. Mr. Landahl in all his statements did not mention that recourse had ever been made to the courts.

Mr. Landahl said that these interests had discriminated against him, and he submitted a contract executed on behalf of the Province of British Columbia and B. C. Furnaces Ltd., which agreed to pay a bounty of \$3 a ton for pig iron produced in the province. Mr. Landahl also told of other loans he attempted, or were attempted to be negotiated.

The B. C. Furnaces, Ltd., loan which was first tried with an American banking group which said that it could not make the loan because of the Securities and Exchange Act, and an Edinburgh financial house turned down a \$7,500,000 loan previously arranged because all money "had been stopped from exploita-

tion." However, nowhere in Mr. Landahl's statement is there any direct written uncontrovertible proof that the "Morgan-United States Steel" group conspired against him.

It is pointed out by steelmen here in Washington that the Truman Committee could render the country a real service if they could find out just what the rate of steel consumption is as compared to shipments. This, it is said, is the only way to discover whether there is a shortage, a much better way than a concentrated effort to smear the steel industry by a witch-hunt which only results in bad feelings.

## A.C. & D.C. Arc Welders

(CONCLUDED FROM PAGE 55)

Weldability of different machines is a controversial subject upon which machine designers and welding operators do not always agree. The static volt-ampere curve of a welding machine is not the only guide of weldability. The dynamic characteristics of the machine also must be considered.

Efficiency and maintenance costs of welding machines are closely associated with design and construction. Low no-load losses are an important factor if ratio of welding time to over-all time is low. Current drop as the welding machine heats from a cold start is important.

An a.c. machine of the transformer type has higher electrical efficiency than a rotating machine, but transformers have lower power factor unless correction is used. An a.c. transformer welder with proper power factor correction is the most efficient type of single-operator set.

Machines of the a.c. type are somewhat restricted in application because a.c. electrodes are not available for non-ferrous metals such as aluminum, nickel and copper alloys. A.c. electrodes are available for most welding applications on ferrous materials and for these the welding efficiencies, costs and quality are equal to those obtained of d.c. welding machines, or slightly superior.

The major advantage of a.c. over d.c. welding is reduced arc blow, particularly on structures containing angles and corners, and when heavy currents are used. With alternating current, uniform distribution of energy between the electrode and work is of particular advantage.

# PERSONALS

• **W. R. King** has been placed in charge of promotion and sale of motors, controls, and other electric apparatus to the machine tool industry, for General Electric Co. Mr. King has been associated with General Electric since 1928 after graduation from the University of Kentucky. In 1929 he was transferred to the company's industrial engineering department, and in 1936 became a member of the machinery manufacturers' section of the industrial department.

• **James H. Davis** of Dayton, Ohio, has been appointed special assistant to E. F. Johnson, vice-president of General Motors in charge of the Dayton Divisions and the Eastern Aircraft Division. Mr. Davis, who has been general manager of the Moraine Products Division since 1924, will remain in Dayton.

At the same time, announcement was made of the consolidation of the Moraine Products Division and the Delco Brake Division in Dayton. The consolidated organization, which will be known as the Moraine Products Division, will be headed by **Bernard A. Brown**, as general manager. Mr. Brown is now general manager of the Delco Brake Division. **Earl S. Patch**, who has been active in the development of the powdered metal products of the Moraine Division, will continue with similar responsibilities in the new division.

Mr. Davis joined General Motors in Dayton in 1920 and was placed in charge of farm experimental work in the Research Division. He became general manager of the Moraine Products Division in 1924. Mr. Brown began his business career with Dayton Engineering Laboratories Co. in 1913, on the assembly line. In 1916, he was appointed resident inspector and later served in this capacity for Delco in Flint and Detroit, returning to Dayton in May, 1919. In 1926, he was transferred to the Delco-Remy Division and in 1929 was transferred to Delco Products Division.

• **Bert Dingley**, former executive vice-president of Marmon-Herrington Co., Inc., automotive manufacturers, has been made president. Assisting him will be the following vice-presidents, also recently elected: **R. C. Wallace**, in



W. R. KING, who has been placed in charge of promotion and sale of General Electric Co. apparatus to the machine tool industry.

charge of engineering; **Seth Klein**, in charge of production; **C. Alfred Campbell**, in charge of public relations; **George E. Reynolds**, in charge of the eastern district.

To succeed **D. I. Glossbrenner**, who has resigned as secretary-treasurer to enter military service, **William B. Nottingham** has been elected secretary, and **H. DeBaun**, treasurer. **John J. Klein** is named assistant secretary, and **L. M.**



G. P. LONGABAUGH, who will coordinate and direct manufacturing engineering activities of Westinghouse Electric & Mfg. Co.'s subcontracting program. News of his appointment appeared last week.

**O'Connor** assistant treasurer. **A. W. Herrington** continues as active chairman of the board of directors.

• **Lloyd L. Loeb**, general manager of Metallic Belt Link Division, General Aviation Co., Wilkes-Barre, Pa., has been appointed chairman of the committee on dies of the Metallic Belt Link Manufacturers' Production Committee.

• **J. W. Biggerstaff**, **E. W. Bradford**, **J. P. Fleming**, **J. A. Gaulty** and **J. D. Reynolds** have been appointed assistant superintendents for the American Locomotive Co. plant at Schenectady. All of the new assistant superintendents are veteran employees of the company.

• **Stanley C. Schuler**, recently resigned as associate editor of *House Beautiful*, is now associated with the New York public relations section of the General Electric Co. He succeeds **Lieut. William H. Dinsmore**, now in active service with the U. S. Navy, as general assistant to **K. G. Patrick**.

**Edward L. Robinson** has been appointed New York publicity representative of the General Electric radio, television, and electronics department. Mr. Schuler has previously been associated with the Birmingham, Ala., *Post* and with the McGraw-Hill Co. in San Francisco. Mr. Robinson was previously with the publicity department of General Electric in Schenectady.

• **Frank J. Smith**, for some years general superintendent of the iron mines of Oglebay, Norton and Co. in Michigan and Minnesota, has been appointed general superintendent of the company. Mr. Smith has been with the company since 1908, beginning at Commonwealth, Wis., later working on the Menominee Range in Michigan and since 1933 on the Gogebic Range. His headquarters will continue to be at Ramsay, Mich.

• **Robert L. Warfel** has been named a research engineer on the staff of Battelle Memorial Institute, Columbus, Ohio, and has been assigned to the division of analytical chemistry. Prior to joining the Battelle staff, Mr. Warfel was associated with the Carnegie-Illinois Steel Corp., Gary, Ind. He received his technical training at Ohio State University.

• **N. F. Melville** has been appointed assistant manager of sales,



steel and wire products, for Pittsburgh Steel Co., Pittsburgh. Mr. Melville has been associated with this company in various sales capacities for the past 15 years. He will continue to direct the sales of munitions and of manufacturers wire, as well as taking on his new responsibilities.

- **Charles W. Schott**, Bethlehem Steel Co., has been appointed research fellow of the open hearth committee of the Institute of Mining and Metallurgical Engineers. Mr. Schott has been engaged in open hearth work in Johnstown for the past five years.

- **R. Edson Emery**, president, Jessop Steel Co., Washington, Pa., is celebrating his 42nd anniversary of service in the steel industry. Mr. Emery started in 1900 with Crucible Steel Co., serving in many capacities, and was general superintendent of all works in 1922 when he left Crucible to become president of Superior Steel Co. In 1927 he became vice-president of the Colonial Steel Co. and since 1929 he has been president of Jessop.

- **W. M. Packer**, vice-president of distribution, has been appointed to aircraft engine relations work of Packard Motor Car Co. Mr. Packer joined the Packard organization in October, 1934, as general sales manager, after many previous years as an automotive

sales executive, and became vice-president of distribution in May, 1938. He will be temporarily relieved of his sales and distribution responsibilities by **Lyman W. Slack**, assistant sales manager, who becomes acting general sales manager. **R. W. Carson**, former assistant sales manager, will aid in the administrative functioning of Packard aircraft engine contracts.

- **William L. Davis** has been appointed manager of operations of Scully Steel Products Co., United States Steel Corp. subsidiary. Mr. Davis' entire business career has been spent with United States Steel subsidiaries.

- **E. P. Cramer** has been appointed advertising manager of the Edison Storage Battery Division, Thomas A. Edison, Inc. Mr. Cramer has been with the advertising department of the division for ten years as field editor of *Storage Battery Power*, a house publication. Before joining Thomas A. Edison, Inc., he was on the staff of James F. Newcomb & Co., New York, advertising agency and was also a free lance writer on industrial subjects.

- **Frederick G. Dawson** has been named general manager, and **Leonard C. Mallet** has been named assistant general manager of United Aircraft Corp. of Missouri's new Kansas City plant. Mr. Dawson started with United

Aircraft and Transport Corp., predecessor of United Aircraft Corp., in 1929 as manager of the West Coast branch of Hamilton Standard Propellers. A year later he was appointed manager of United Airport at Burbank, Cal., and in 1932 was elected president of United Airport Corp. of California, Ltd. In 1939 he was sent abroad to represent the export corporation in Australia. Returning to the United States in July, 1940, he was named assistant to the general manager of Pratt & Whitney Aircraft and two months ago was appointed an assistant secretary of United Aircraft Corp.

Mr. Mallet also came to United Aircraft in 1929, in charge of the cost department at Sikorsky Aircraft. Previously he had been associated with the Fairchild Airplane Mfg. Co. and the General Airplanes Corp. In 1938 he was named division accountant of Pratt & Whitney Aircraft.

- **W. N. Wood** has been appointed plant manager of the American Propeller Corp., Toledo, succeeding Wayne Eddy, who has resigned. Mr. Wood comes to Toledo from Caldwell, N. J., where he was factory manager of the propeller division of Curtiss-Wright Corp. Prior to that, he was general superintendent of the Spicer Mfg. Co., Toledo, general superintendent of Nordyke & Marmon Co., Indianapolis; and factory manager of the New Britain Machine Co., New Britain, Conn.

- **L. L. Lessig**, contracting engineer, fabricated steel division, Bethlehem Steel Co., has accepted a commission of Major in the U. S. Army Engineer's Office. He will be stationed in Philadelphia.

- **Charles R. Rall** has been elected chairman of the board of directors of Pittsburgh Piping & Equipment Co., Pittsburgh. **L. K. Hamilton**, formerly vice-president of the company, has been elected president, the position formerly held by Mr. Rall. **Karl F. Tiegel**, formerly general purchasing agent, has been named vice-president.

- **Joseph Michaels** has been elected chairman of the board of Hyman-Michaels Co., Chicago. **Sparrow E. Purdy** has been elected president and **Everett B. Michaels** executive vice-president.

**BRITISH ON VISIT:** Miss Amelia Branahl introduces visiting British officers to a seven-point worker's plan for production victory, during a plant tour.



• **Harold C. Lucht**, former civil engineer with the Harnischfeger Corp., Milwaukee, housing division, has been commissioned a captain in the Army and assigned to the Buffalo district.

• **Col. Robert H. Morse**, president and general manager of Fairbanks, Morse & Co., Beloit, Wis., has created the John Morse Memorial Foundation, with its first project the erection of a new hospital at Beloit. The foundation is a memorial to Col. Morse's son, who was killed in an automobile accident in San Francisco about a year ago. The son at that time was assistant manager of the firm's San Francisco branch.

• **H. W. Anderson** and **M. J. Rice** have been promoted to vice-presidents of the Whiting Corp., Harvey, Ill. Mr. Rice has formerly been in charge of the steel plate shear department of the Quickwork-Whiting Division. Mr. Anderson has been in charge of the aircraft division of the company.

• **William A. Harding** has been appointed manager of sheet, plate and specialties, Jessop Steel Co., Washington, Pa. Mr. Harding had been associated with Crucible Steel Co. for the past 20 years.

• **Commander R. E. W. Harrison** has been released from active duty after serving a little more than two years as a staff officer in the offices of the assistant and under secretaries of the U. S. Navy. He will devote his efforts to the provision of the basic tools required to produce urgently needed airplanes.

• **Lloyd L. Loeb**, general manager of the Metallic Belt Link Division of General Aviation Co., has been appointed to the chairmanship of the committee on dies of the Metallic Belt Link Manufacturers' Production Committee. The appointment was made by William A. Baker, assistant chairman to Col. E. C. Franklin of Washington who heads the national committee.

• **William D. Bliss**, head of the Bliss Brothers Tool Co., Milwaukee, former head of the chemical engineering department at Marquette University, has been appointed as director of industrial relations which places students with local firms during some periods of their training.

• **M. B. Elliot** has been appointed Manager of Sales, Unit Equipment Section, General Electric Co., Schenectady. In 1920, Mr. Elliot joined General Electric as a test

engineer. He was transferred in 1924 to the central station department, and in 1926 was sent to Cleveland as transformer specialist.

## OBITUARY...

• **Edward R. Carnell**, manager of the Pittsburgh office, of A. Milne & Co., died July 28, in Pittsburgh. He joined the sales force of the Edgar Allen Steel Co. which was later purchased by A. Milne & Co. in 1928. Mr. Carnell was attached to the Chicago office until then and opened the Pittsburgh branch on Jan. 1, 1939.

• **Paul Keiser**, founder and president of the Pottstown Metal Products Co., died August 5, aged 59 years.

• **John G. Benedict**, president of the Landis Machine Co., died in Waynesboro, Pa., on August 4, aged 70 years. He started his industrial career in 1900 as an employee in the office of the Landis Tool Co. A little later he became identified with the Fred Frick Clock Co., Waynesboro, as secretary. Then he was appointed branch manager for Minneapolis for the Geiser Manufacturing Co., also of Waynesboro. Early in 1904 he was called to Waynesboro to become secretary and treasurer of the Landis Machine Co.

• **John H. Schmeller**, former president and chairman of the board of the National Bronze & Aluminum Foundry Co., Cleveland, died Aug. 12, aged 85 years. Mr. Schmeller, who was widely known as a builder, also held several patents on methods of processing aluminum and other metals.

• **Nicholas D. Chard**, founder of the New Castle Chard Lathe Co., New Castle, Ind., died last week in California, aged 79 years. Mr. Chard was born in Cincinnati and for 12 years was associated with the Baker & Chard Machine Tool Co. there. In 1914 he established the New Castle Chard Lathe Co. on its present site in New Castle and was active in its management until his retirement 10 years ago.

• **Charles Katchem**, shop superintendent of the Schwab Boiler & Machine Shop, Milwaukee, died Aug. 1 in a hospital there after a week's illness. He was 59 years old. Mr. Katchem came to Milwau-

kee six years ago from Minneapolis where he was proprietor of the Modern Laundry Machinery Co.

• **Douglas Reid Clarkson** of D. R. Clarkson, machine tools, Buffalo, died Aug. 11. He had been in the machinery business for 40 years.

• **Harry J. Leschen**, president, A. Leschen & Sons Rope Co., died Aug. 2 at his home in St. Louis.

• **Rudolph Schoemann**, general foreman for the Pressed Steel Tank Co., Milwaukee, for more than 40 years, died at his home Aug. 10 after an illness of several years.

• **John P. Sykes**, age 83, a vice-president of the Baldwin Locomotive Works in Eddystone for 23 years prior to his retirement in 1940, died Aug. 17 at his home in Wallingford after a long illness. Mr. Sykes entered the employ of the Baldwin Company in 1879. He was named vice-president in charge of manufacture in 1917 and during the first World War, workmen under his direction turned out in three weeks, the first locomotive to be shipped to Europe after this country entered the war. He was made a company director in 1931 and resigned nine years later because of illness. He was a member of the Union League, the Franklin Institute, and numerous other organizations.

• **Roy L. Diercksmeier**, for 29 years manager of various sales offices for the Heil Co., Milwaukee, and who in recent years had been operating a steel fabricating business in Chicago, died Aug. 7 in Chicago.

• **Edward H. Robinson**, storekeeper for the Nordberg Mfg. Co., Milwaukee, died in a local hospital after a two-weeks' illness. He started with Nordberg in 1903 and had been storekeeper since 1916.

• **John F. Wyzalek**, chief metallurgist for the Hyatt Bearings Division, General Motors Corp., Harrison, N. J., died suddenly on Aug. 8 after a heart attack. He was 47 years old. Mr. Wyzalek contributed many articles on gas carburizing, heat treating and other metallurgical subjects to technical and trade papers.



# NON-FERROUS METALS

... MARKET ACTIVITIES AND PRICE TRENDS

## Labor, Wage Problems Face Copper Industry

... Domestic copper production could have been 5000 tons higher in July if sufficient labor had been available at the mines, primary copper producers reported to WPB Aug. 13. The report of the copper industry advisory committee, which said that selective service had taken 20 per cent of the workers from some mines, and that shipyards, aircraft plants and construction projects were offering higher wages than copper mines, stirred up the following:

Major General Louis B. Hershey, director of Selective Service, who announced that individuals engaged in copper mining, whose work is found by local boards to be essential, will be deferred in the draft;

Brigadier General Frank J. McSherry, director of operations of the War Manpower Commission, who urged mine operators to use the United States Employment Service, and offered hope that copper miners can be recruited from among idle miners in other parts of the country;

The War Labor Board, which decided to meet Aug. 19 to discuss the problem and consider wage demands;

Lieutenant General Brehon B. Somervell, chief of the Army Services of Supply, who made a blanket recommendation to the WPB that surplus workers from the coal, iron and gold mines be shifted to copper mines; and

A five-man committee, representing WPB, WLB, OPA, Army Services of Supply and the Manpower Commission, was said by an anonymous WPB official, to be deliberating a plan to prevent workers from leaving their copper mine jobs in favor of higher paying shipyard and war plant work.

Lead and zinc, as well as copper mines are affected by the labor shortage. It is estimated that 3000 out of 25,000 miners in the lead-zinc mines have shifted to industrial jobs. The CIO, representing 20,000 workers in the three industries, is asking wage increases ranging from \$1 to \$1.55 a day. Wage hearings by a WLB panel began Aug. 19. Thirty-seven mines,

mills and smelters are directly involved, but findings probably will govern the wage scale of the entire industry.

The brass and bronze alloy ingot weighted average selling price was reduced about 1.20c. per lb. below the March level, on Aug. 19, by OPA. Contracts made prior to July 10, at prices established by the General Maximum Price Regulation may be carried out until Sept. 1 at the contract prices, however.

The new regulation, No. 202, establishes the following maximums for the more important grades of brass and bronze ingots, in carload lots, compared with the previously established maximums and the actual market prices prior to issuance of the new regulation.

		Cents Per Lb.			
		M.P.R. No. 202	Market Price		
		Maxi-	G.M.P.R.	M.P.R.	
Ingot No.	Commercial Designation	mum Price	Price	Prior to No. 202	
115	85-5-5-5	12.25	13.00	13.00	
215	88-10-2	16.50	17.50	17.00	
225	Navy "G"	16.75	18.25	17.75	
245	Navy "M"	14.75	16.00	15.25	
305	80-10-10	14.25	15.50	15.50	
405	Yellow	10.00	11.00	11.00	
415	Aluminum				
	bronze	15.75	17.25	16.50	
420	60-65,000 manganese				
	bronze	12.75	14.00	13.25	
500	Silicon				
	bronze	15.50	Various	Various	

These prices include transportation costs not exceeding 25c. per cwt., in continental United States. For sales and deliveries in less than carload lots, a premium of 1/4c. per lb. may be added.

The OPA has also announced that the price of 8.75c. per lb for No. 2 copper wire and mixed heavy copper, given in Appendix A, Amendment No. 1, to Revised Price Schedule No. 20, as amended, is incorrect. It should be 8.65c. The price became effective Aug. 17.

Relief was given to Painesdale, Mich., an isolated copper mining community, on Aug. 12, when OPA allowed the Copper Range Co. of that city, to exceed the ceiling price for solid fuels, in order to prevent a serious fuel shortage in the community.

All secondary aluminum ingot

and practically all grades of aluminum scrap are now included in the provisions of revised price schedule No. 2. The new, broader schedule will become effective Aug. 14. Maximum prices for all grades of obsolete scrap except pure cable, are reduced 1c. per lb.. The earlier price was established when OPA was attempting to encourage collection of obsolete scrap. Now, however, Mr. Henderson says, there is an excess accumulation because its consumption has been reduced in favor of plant scrap at lower prices.

Mexican metal production, with the exception of copper, rose toward an all time high in the first quarter of this year, according to the Mexican mining industry's official journal. The journal's mining index shows the highest production in ten years, except for a brief period in 1938 when orders from rearming Europe sent output above the 1929 mark. Industrial metal production has risen relatively higher than precious metal. In July, 1941, Mexico agreed not to export any strategic minerals or metals outside the Western Hemisphere, and last April pledged a full-scale mining effort under an agreement which boosted prices and provided for this country's financial aid for mining development.

Mineral production in Mexico during January-October, 1941, compared with the same period of 1940, was as follows (in metric tons):

	1940 Jan.-Oct.	1941 Jan.-Oct.
Copper .....	30,722	41,347
Lead .....	169,422	132,562
Zinc .....	101,191	116,387
Antimony .....	10,226	9,644
Mercury .....	299	666
Arsenic .....	8,549	10,651
Cadmium .....	682	656
Tin .....	256	174
Molybdenum .....	397	791
Manganese .....	292	534
Tungsten .....	80	74
Vanadium .....	14	.....

Tin consumption in Canada is reported by the Canadian Department of Munitions and Supply to be 40 per cent less than before the war. Figures for civilian use alone show a drop of 75 per cent. Civilian use probably amounts to about 50 tons a month at present, with overall use probably at 150 tons.

# MACHINE TOOLS

... SALES, INQUIRIES AND MARKET NEWS

## Priority Changes Hamper Producers

Cincinnati

• • • While manufacturers generally recognize that Washington has a tremendous job on its hands, complaint is frequently being heard about new orders and requests from the Capitol city. Frequent change in priorities on machines already in production or scheduled, place a heavy burden on the manufacturer and cause some loss of time in rearranging production boards. Recent change in material priority, whereby only half of the estimated material will be available for machine tools, is causing a lot of scurrying around by procurement departments in an effort to keep production going.

In one or two instances, manufacturers feel that there will be a definite retardation in output because of the material situation. Cancellation of orders has slowed up materially and manufacturers indicate that the only orders now being withdrawn from the books could probably be called a shift in source, rather than actual cancellations. The situation is, that some purchasers are able to get earlier deliveries from other manufacturers than those with which they have already contracted, and thus the order is erased from one order book only to be placed upon the manufacturer able to give more prompt delivery.

## Production of Certain Size Shells Being Curtailed

Cleveland

• • • Apparently our shell production in certain sizes has forged far ahead of earlier expectations, so that it has become necessary for various ordnance offices to curtail production of them. In some cases, the contractors were instructed to retool for production of shells of different sizes on which the supply could stand replenishing at present. So far as the tooling of other types of war plants is concerned, progress is being made in the rearranging of proposed production lines to permit the use of more easily available machines,



**MORALE BULLETINS:** Workers of Warner & Swasey Co., Cleveland, examine with interest one of 25 illuminated bulletin boards installed throughout the plant for the dissemination of current information and war production bulletins.

either of types on which delivery is not so badly jammed, or in some cases of used machines practically recovered from the junk pile. The War Department has purchased a large number of "junkers," which shortly will be put to work on some war machining where good use can be made of this old equipment.

Machine tool companies whose books were particularly clogged with orders have been receiving a greater portion of cancellations in recent weeks, because war contractors have been forced to use substitute machines which were more easily available. In effect, this tendency will aid in distribut-

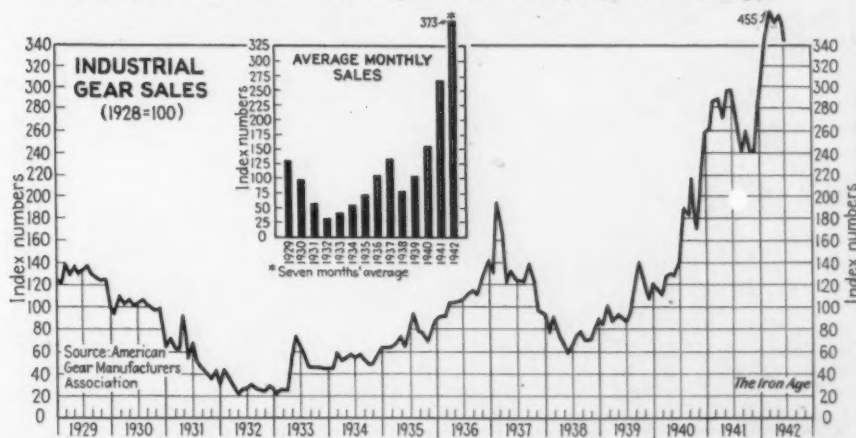
ing the machine tool load more equitably throughout the industry.

Demand for cutting tools and gages is still heavy, and many orders appear to be along extravagant lines, in that there is little question that some of the tools ordered are not actually required for the work at hand. Delivery on many cutting tools is now on a four to six months' basis, while gages may be secured anywhere from three to ten months, depending on the type. It is interesting to note that some customers insist on high speed steel taps in certain applications where carbon steel would do as well.

## Industrial Gear Sales Declined in July

• • • Sales of industrial gears during the month of July dropped 7.8 per cent below the June figure, according to the American Gear Manufacturers Association; but the July figure is 15.4 per cent above the corresponding month of 1941. For the seven months of 1942 sales were 32.5 per cent higher than they were in the same period last year.

*This compilation includes only industrial gears. It does not cover gears made for automotive or armament use, or gears used in high speed turbine drives.*





# SCRAP

... MARKET ACTIVITIES AND QUOTATION TRENDS

## **Washington Faces Facts; Action May Speed Drive**

... Although the Nation's scrap drive is going along at a good clip in some areas, in others it is still faltering. It has been repeatedly pointed out that household and farm drives would not bring in the amount of scrap necessary to keep steel production at present levels but that there was scrap available from other sources which could not be collected because of OPA price ceilings.

Two developments in Washington

indicate that government officials will finally accept the experience and knowledge of scrap men to aid in overcoming the serious scrap shortage. This trend was indicated by the announcement of the formation of the Waste Materials, Inc., a subsidiary of Metals Reserve Corp., which will have experienced scrap men to buy up and resell at least 5,000,000 tons of scrap, mostly from uneconomic sources, unobtainable under present OPA price ceilings.

At the same time, it was announced that the OPA was setting up an advisory board to be made

up of experienced scrap men to handle problems and difficulties facing scrap dealers and brokers from time to time. It is believed that this shift in the attitude of Federal officials is the most favorable development in the scrap situation since the institution of OPA price ceilings.

In the steel and scrap trades, the plan of War Materials, Inc., whose organization was announced on Monday by Secretary of Commerce Jesse Jones, is considered to be practical and by reason of paying high costs is expected to get material not otherwise available from old bridges, mines, abandoned rail lines, old buildings and other sources. It is understood that the scrap when recovered will be shipped to dealers' yards and prepared by them for shipment to the mills.

Meanwhile the Pittsburgh chapter of the Institute of Scrap Iron & Steel expects to set up a fund to underwrite uneconomical charges accruing to dealers handling scrap in salvage drives. This move was decided by an executive committee, although it may be necessary to secure approval of the OPA to underwrite abnormal cost, which might possibly be construed as a violation of the OPA ceiling.

## **WPA Turns Up Scrap**

Washington

... WPA employees, scouring back roads of the farm country and extracting abandoned rails from city streets, have turned up 100,000 tons of scrap metal for the production of war implements, since last October.

The rural scrap has been collected under a nation-wide WPA project sponsored by the Conservation Division of the War Production Board and operated in conjunction with the Department of Agriculture and the state salvage offices of the WPB. The car rails have been removed in part through regular locally-sponsored WPA street projects and to an increasing extent through the nation-wide collection project.

**TREND IS TO WOOD:** The present tightness in structural steel is forcing the use of wood in construction, as for instance this large span arch roof structure in a shipbuilding yard. Supports for the craneway are structural steel. This photo shows one of General Excavator Co.'s one-man Supercranes erecting a prefabricated wood arch member.



## New Ideas Utilized In Scrap Drive

Cleveland

••• The Cleveland scrap reclamation committee has set a price of 30c a 100 lb. for iron and steel scrap, in preparation for its collection to be conducted this week. Collection cans have been placed in 1500 gasoline stations this week, under an agreement with the Petroleum Dealers' Association. In addition, approximately 8000 volunteer women workers are making a house-to-house canvass to induce housewives to contribute their scrap to the drive, whose slogan will be "Clean Out Your Attics." Prices have also been set for non-ferrous scrap, paper and rags. Scrap contributed to the stations will later be purchased by the city at prevailing prices, and the money representing its value will be eventually turned over to the USO or some other patriotic agency. Junk dealers will be given the privilege of buying the scrap from the gasoline stations and then selling it to scrap yards for preparation and shipment to steel mills. The plan uses existing scrap collecting machinery, and supplements it with measures increasing the effectiveness of the drive.

## Dairy Industry to Collect Scrap

Washington

••• WPB last Saturday said that it expected that more than 500 tons of nickel, brass, bronze, and stainless steel would be collected in its "new campaign" (sic) launched to collect scrap from dairies. A collection goal of 30 lb. from each of the country's 37,000 dairies has been set.

The program will be confined to bottling depots, cheese plants and ice cream manufacturers. Dairy equipment manufacturers and jobbers are to cooperate through their sales and service representatives. Equipment manufacturers' and jobbers' representatives are supposed to locate scrap sources and arrange for its transportation to central warehouses.

ST. LOUIS—Scrap receipts have picked up somewhat, but are still too small to permit inventory building by mills. Apprehensions are growing relative to supplies for the late fall and winter. The government drive is taking firm hold in this general area, and already some counties are exceeding their allotted quotas. Considerable material is being produced by the railroads, also by de-

moltion of old buildings in the metropolitan district.

PHILADELPHIA—Artificial easing of supply last week caused by reduced deliveries to a flooded mill cheered no one, since usual subnormal conditions will return when the affected mill comes into full production later this week. Dealers report no noticeable effects from the month-old salvage publicity campaign as inventories continue to dwindle.

PITTSBURGH—Scrap dealers report that within the past 10 days or so the movement in this area appears to have fallen off. Apparently, no one seems to know the reason for it, although one opinion expressed was to the effect that vacations of some scrap dealer representatives may have partly accounted for the falling off.

CHICAGO—The scrap movement here continues thin with practically all district mills operating on a hand to mouth basis. Entry of the RFC into the scrap picture is expected to be of value in moving some tonnages which have been tied up over price questions. It is not likely, however, that this agency will of its own effort be able to bring in enough scrap to permit building stockpiles against the winter months.

CLEVELAND—Some scrap dealers appear to be highly successful in securing

scrap, while the Republic Steel Corp. continues to add to a comfortable position at its plant here. Otherwise, collections seem to be falling off and the movement is none too encouraging, as a whole.

BIRMINGHAM—With harvest at hand and farmers busy in the fields, a seasonable decline here in receipts of country scrap is noticeable.

BUFFALO—The national drive to bring out more scrap metal still is making no appreciable difference here. Some public spirited "scrap sleuths" have reported to the newspapers large quantities of "forgotten" scrap accumulations in public parks and in old abandoned buildings. The information has been turned over to the proper authorities, but as yet nothing visible has been done about it. Hot metal charges at two steel plants have been increased because of the scrap shortage.

CINCINNATI—Scrap dealers continue to complain about difficulties with Washington on interpretations of scrap ceiling prices. On the other hand, they indicate that while there is no serious situation in the supply of old materials in this area, agricultural scrap is not coming out in anticipated proportions. Industrial scrap, on the other hand, is being absorbed almost as rapidly as it is produced, and hopes are still being held for the National Scrap Drive to reveal new sources.

## MOORE RAPID LECTROMELT FURNACES



### TOP CHARGE TYPE

Illustrated is a recent installation of 10 ton capacity, top charge type, LECTROMELT furnace in pouring position. This is the second LECTROMELT installed in the same plant, and a third is now being built. These and many others are now producing essential alloy steel 24 hours per day, 7 days a week.

★ Use of top charge type LECTROMELTS result in greater production, lower power consumption, lower electrode and refractory costs, and increased tonnage per man hour. They are built in standard sizes ranging from 100 tons down to 250 lbs. Write for information on LECTROMELTS to meet your melting requirements.

PITTSBURGH LECTROMELT FURNACE CORPORATION  
PITTSBURGH, PENNSYLVANIA



# SCRAP PRICES

## IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

### ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES (No. 1 Heavy Melting; No. 1 Hydr. Com- pressed Black Sheets; No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)			BLAST FURNACE GRADES (Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)			Bar Crops, Punch- ings, Plate Scrap and Cast Steel			F.T.C. and Under Auto, Springs, and Crank- shafts					Alloy free Low Phos. and Sulphur Turnings		Heavy Axle and Forge Turn. First Cut		Electric Furnace Bundles
	Machine Shop Turnings						3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under								
Pittsburgh, Brackenridge. Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....	\$20.00	\$16.00	\$16.00	\$25.00	\$22.50	.....	\$21.00	\$21.50	\$22.00	\$20.00	\$20.50	\$21.00	\$18.00	\$19.50	\$21.00				
Cleveland, Middletown, Cincinnati, Portsmouth.....	19.50	15.50	15.50	24.50	22.00	.....	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50				
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt. . .	18.75	14.75	14.75	23.75	21.25	.....	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75				
Ashland, Ky. ....	19.50	15.50	15.50	24.50	22.00	.....	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50				
Buffalo, N. Y. ....	19.25	15.25	15.25	24.25	21.75	.....	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25				
Bethlehem, Pa.; Kokomo, Ind. ....	18.25	14.25	14.25	23.25	20.75	.....	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25				
Duluth, Minn. ....	18.00	14.00	14.00	23.00	20.50	.....	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00				
Detroit, Mich. ....	17.85	13.85	13.85	22.85	20.35	.....	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85				
Toledo, Ohio.....		13.85	13.85			.....													
St. Louis, Mo. ....	17.50	13.50	13.50	22.50	20.00	.....	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50				
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Mo.; s Angeles; Pittsburg, Cal.; San Francisco	17.00	13.00	13.00	22.00	19.50	.....	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00				
Minneapolis, Colo. ....	16.50	12.50	12.50	21.50	19.00	.....	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50				
Seattle, Wash. ....	14.50	10.50	10.50	19.50	17.00	.....	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50				

**BUNDLES:** Tin can bundles are \$4 below dealers' No. 2 bundles; No. 3 bundles are \$2 less than No. 1 heavy melting.

**SWITCHING CHARGES:** Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati\*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. \*At Cincinnati, for basic open hearth grades, cut auto scrap and auto springs and crankshafts, deduct 80c. per ton.

**PITTSBURGH** basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

**MAXIMUM** prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

**MAXIMUM SHIPPING POINT PRICE**—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. Dock charge is 75c. a ton\*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established trans-

portation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.\* For exceptions see official order.

**AT NEW YORK** city or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.65 per ton.

**UNPREPARED SCRAP:** For unprepared scrap, maximum prices shall be \$2.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less than the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order).

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed.

**CHEMICAL BORINGS:** No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

**UNPREPARED CAST IRON SCRAP**—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

\*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

### RAILROAD SCRAP

	Scrap Rails			Scrap Rails		
	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	3 ft. and Under	2 ft. and Under	18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown....	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington, Birmingham, Los Angeles, San Francisco.....	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo.....	20.25	21.25	22.75	23.25	23.50	23.75
Detroit.....	18.85	19.85	21.35	21.85	22.10	22.35
Duluth.....	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.....	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.....	19.25	20.25	21.75	22.25	22.50	22.75
Seattle.....	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis.....	18.50	19.50	21.00	21.50	21.75	22.00

### CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast.....	\$18.00	\$19.00	\$20.00
No. 1 machinery cast, drop broken, 150 lbs. and under.....	18.00	19.00	20.00
Clean auto cast.....	18.00	19.00	20.00
Unstripped motor blocks.....	17.50	18.50	19.50
Stove Plate.....	17.00	18.00	19.00
Heavy Breakable Cast.....	15.50	16.50	17.50
Charging box size cast.....	17.00	18.00	19.00
Misc. Malleable.....	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switch district of Kansas City, Kan., Mo.

# Composite Prices

Advances Over Past Week in **Heavy Type**; Declines in *Italics*.

(Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Hot rolled sheets.....	2.10	2.10	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates .....	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Tin plate .....	\$5.00	\$5.00	\$5.00	\$5.00
Manufacturing ternes ..	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Merchant bars .....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars .....	2.70	2.70	2.70	2.70
Structural shapes ....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00

Wire and Wire Products: (Cents Per Lb.)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Plain wire .....	2.60	2.60	2.60	2.60
Wire nails .....	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Heavy rails .....	\$40.00	\$40.00	\$40.00	\$40.00
Light rails .....	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Rerolling billets .....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars .....	34.00	34.00	34.00	34.00
Slabs .....	34.00	34.00	34.00	34.00
Forging billets .....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	Aug. 18, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Wire rods .....	2.00	2.00	2.00	2.00
Skelp (grvd) .....	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Aug. 17, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
No. 2 fdy., Philadelphia..	\$25.89	\$25.89	\$25.89	\$25.84
No. 2, Valley furnace...	24.00	24.00	24.00	24.00
No. 2, Southern Cint'...	24.68	24.68	24.68	24.06
No. 2, Birmingham.....	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa...	25.39	25.39	25.39	25.34
Basic, Valley furnace....	23.50	23.50	23.50	23.50
Malleable, Chicago† ....	24.00	24.00	24.00	24.00
Malleable, Valley .....	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago..	31.34	31.34	31.34	31.34
Ferromanganese† .....	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.  
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Aug. 17, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Heavy melt'g steel, P'gh..	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Young'sn	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh...	20.00	20.00	20.00	22.00
No. 1 cast, Philadelphia.	20.00	20.00	20.00	24.00
No. 1 cast, Ch'go.....	20.00	20.00	20.00	20.00

Coke, Connellsville: (Per Net Ton at Oven)	Aug. 17, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$6.125
Foundry coke, prompt...	6.875	6.875	6.875	6.875

Non-Ferrous Metals: (Cents per Pb. to Large Buyers)	Aug. 17, 1942	Aug. 11, 1942	July 21, 1942	Aug. 19, 1941
Copper, electro., Conn...	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis....	8.25	8.25	8.25	7.25
Lead, St. Louis.....	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 128 to 136 herein.

# Comparison of Prices

FINISHED STEEL		PIG IRON		SCRAP STEEL	
Aug. 18, 1942.....	2.30467c. a Lb.....	.....23.61 a Gross Ton.....	.....\$19.17 a Gross Ton.....		
One week ago.....	2.30467c. a Lb.....	.....23.61 a Gross Ton.....	.....\$19.17 a Gross Ton.....		
One month ago.....	2.30467c. a Lb.....	.....23.61 a Gross Ton.....	.....\$19.17 a Gross Ton.....		
One year ago.....	2.30467c. a Lb.....	.....23.61 a Gross Ton.....	.....\$19.17 a Gross Ton.....		

HIGH		LOW		HIGH		LOW	
1942.....	2.30467c.,	2.30467c.,	2.30467c.,	23.61	23.61	\$19.17	\$19.17
1941.....	2.30467c.,	2.30467c.,	2.30467c.,	\$23.61, Mar. 20	\$23.45, Jan. 2	\$22.00, Jan. 7	\$19.17, Apr. 10
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16		23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939.....	2.35367c., Jan. 3	2.26689c., May 16		22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18		23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4		23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10		19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8		18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2		17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933.....	1.95578c., Oct. 3	1.75836c., May 2		16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932.....	1.89196c., July 5	1.83901c., Mar. 1		14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931.....	1.99629c., Jan. 13	1.86586c., Dec. 29		15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9		18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929.....	2.31773c., May 28	2.26498c., Oct. 29		1871, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

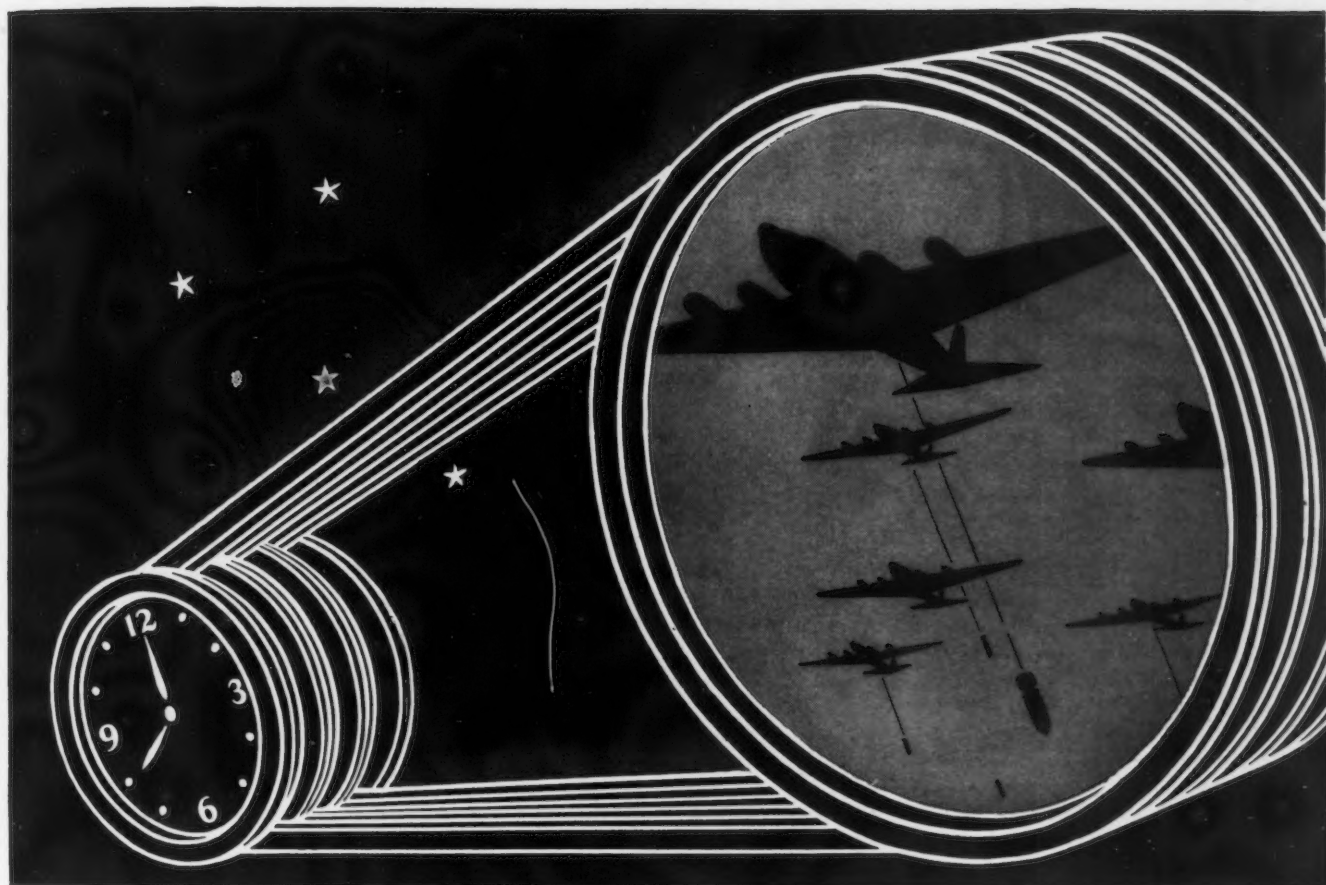


# Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
<b>SHEETS</b>															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled <sup>1</sup>	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes <sup>2</sup>	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
<b>STRIP</b>															
Hot rolled <sup>3</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled <sup>4</sup>	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
<b>TIN PLATE</b>															
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34¢
<b>BLACK PLATE</b>															
29 gage <sup>5</sup>	3.05¢	3.05¢	3.05¢						3.15¢			<sup>13</sup> 4.05¢			3.39¢
<b>TERNES, M'FG.</b>															
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
<b>BARS</b>															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel <sup>6</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢ <sup>14</sup>			
Reinforcing (billet) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ <sup>14</sup>	2.27¢	2.40¢	
Reinforcing (rail) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢	2.27¢		2.49¢
Cold finished <sup>8</sup>	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
								(Coatesville and Claymont = 2.10¢)							
<b>PLATES</b>															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ <sup>(11)</sup>		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢									3.97¢	4.15¢		3.71¢	3.60¢
								(Coatesville = 3.50¢)							
<b>SHAPES</b>															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.47¢	2.75¢		2.28¢	2.22¢
<b>SPRING STEEL, C-R</b>															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
<b>WIRE<sup>9</sup></b>															
Bright <sup>10</sup>	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)				3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)				3.70¢			3.54¢
<b>PILING</b>															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢
<b>IRON BARS<sup>12</sup></b>															
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

<sup>1</sup> Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. <sup>2</sup> Unassorted 8-lb. coating. <sup>3</sup> Widths up to 12 in. <sup>4</sup> Carbon 0.25 per cent and less. <sup>5</sup> Applies to certain width and length limitations. <sup>6</sup> For merchant trade. <sup>7</sup> Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. <sup>8</sup> Also shafting. For quantities of 20,000 to 39,999 lb. <sup>9</sup> Carload lot to manufacturing trade. <sup>10</sup> These prices do not apply if the customary means of transportation (rail and water) are not used. <sup>11</sup> Ship plates only. <sup>12</sup> Common iron bars quoted at 2.15c. by Terre Haute, Ind. producer. <sup>13</sup> Boxed. <sup>14</sup> Portland and Seattle price, San Francisco price is 2.50c. <sup>15</sup> This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.



## Not "too little and too late" with Multiple V-Belt Drives

TIME AFTER TIME, the events of this war have proved the sorry truth that "too little and too late" inevitably spell disaster. Shortages of planes and tanks and other equipment impose a terrific handicap at frightful odds on the armed forces.

It is fortunate indeed for America at war that standardized Multiple V-Belt Drives are available to transmit power smoothly, quietly, and efficiently to the machines turning out the sinews of war.

And this is true only because, years ago, members of the Multiple V-Belt Drive Association pooled their efforts and information obtained from thousands of experiments and field tests, in developing the *Dominant Drive of Industry—and Victory.*



The use of this emblem by an association member in connection with Multiple V-Belt Drives is your assurance of mechanical excellence — the result of co-operative engineering, research and experience.



TRADE MARK

The Dominant Drive  
is the "Victory" Drive

**MULTIPLE - V - BELT DRIVE ASSOCIATION**  
140 SOUTH DEARBORN STREET • CHICAGO



# PRICES

## SEMI-FINISHED STEEL

### Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher.

	Per Gross Ton
Rerolling	\$34.00
Forging quality	40.00

### Shell Steel

	Per Gross Ton
3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.	
Prices delivered Detroit are \$2.25 higher.	

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	\$34.00

### Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

### Wire Rods

	(No. 5 to 9/32 in.)	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.	
Worcester, Mass.	2.10c.	
Birmingham	2.00c.	
San Francisco	2.50c.	
Galveston	2.25c.	

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

### Alloy Steel Blooms, Billets and Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton \$54.00

## TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per Lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

## CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

### Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

### Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

### Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

\*Includes annealing and pickling.

## PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	\$25.53	\$25.03	\$26.53	\$26.03		
Brooklyn	27.65			28.15		
Jersey City	26.62	26.12	27.62	27.12		
Philadelphia	25.89	25.39	26.89	26.39		
Bethlehem, Pa.	\$25.00	\$24.50	\$26.00	\$25.50		
Everett, Mass.††	25.00	24.50	26.00	25.50		
Swedeland, Pa.	25.00	24.50	26.00	25.50		
Steelton, Pa.		24.50			\$29.50	
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	
Sparrows Point, Md.	25.00	24.50				
Erie, Pa.	24.00	23.50	25.00	24.50		
Neville Island, Pa.	24.00	23.50	24.50	24.00		
Sharpville, Pa.*	24.00	23.50	24.50	24.00		
Buffalo	24.00	23.00	25.00	24.50	29.50	
Cincinnati	24.68	24.68		25.18		
Canton, Ohio	25.47	24.97	25.97	25.47		
Mansfield, Ohio	26.06	25.56	26.56	26.06		
St. Louis	24.50	24.00				
Chicago	24.00	23.50	24.50	24.00		\$31.34
Granite City, Ill.	24.00	23.50	24.50	24.00		
Cleveland	24.00	23.50	24.50	24.00		
Hamilton, Ohio	24.00	23.50		24.00		
Toledo	24.00	23.50	24.50	24.00		
Youngstown*	24.00	23.50	24.50	24.00		
Detroit	24.00	23.50	24.50	24.00		
Lake Superior fc.						\$28.00
Lyles, Tenn. fc.†						33.00
St. Paul	26.76		27.26	26.76		
Duluth	24.50		25.00	24.50		
Birmingham	20.38	19.00	25.00			
Los Angeles	27.25					
San Francisco	27.25					
Seattle	27.25					
Provo, Utah	22.00					
Montreal	27.50	27.50		28.00		
Toronto	25.50	25.50		26.00		

GRAY FORGE IRON: Valley or Pittsburgh furnace \$23.50

\*Pittsburgh Coke & Iron Co. (Sharpville, Pa. furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

†Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$1 per gross ton above maximum prices.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

## NATIONAL EMERGENCY STEELS (Hot Rolled)

### Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT									Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Nickel	Chromium	Molybdenum	Vanadium	Bars & Bar-Strip	Billets, Blooms, & Slabs	Bars & Bar-Strip	Billets, Blooms, & Slabs
NE 8024	.22/.28	1.00/1.30	.040	.040	.20/.35			.10/.20		.45c	\$ 9.00	.95c	\$19.00
NE 8124	.22/.28	1.30/1.60	.040	.040	.20/.35			.25/.35		.85	17.00	1.35	27.00
NE 8233	.30/.36	1.30/1.60	.040	.040	.20/.35			.10/.20		.85	13.00	1.15	23.00
NE 8245	.42/.49	1.30/1.60	.040	.040	.20/.35			.10/.20		.85	13.00	1.15	23.00
NE 8339	.35/.42	1.30/1.60	.040	.040	.20/.35			.20/.30		.75	15.00	1.25	25.00
NE 8442	.38/.45	1.30/1.60	.040	.040	.20/.35			.30/.40		.90	18.00	1.40	28.00
NE 8447	.43/.50	1.30/1.60	.040	.040	.20/.35			.30/.40		.90	18.00	1.40	28.00
NE 8547	.43/.50	1.30/1.60	.040	.040	.20/.35			.40/.60		1.25	25.00	1.75	35.00
NE 8620	.18/.23	.70/.95	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25		.75	15.00	1.25	25.00
NE 8630	.27/.33	.70/.95	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25		.75	15.00	1.25	25.00
NE 8724	.22/.28	.70/.95	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30		.80	16.00	1.30	26.00
NE 8739	.35/.42	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30		.80	16.00	1.30	26.00
NE 8744	.40/.47	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30		.80	16.00	1.30	26.00
NE 8749	.45/.52	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30		.80	16.00	1.30	26.00
NE 8817	.15/.20	.70/.95	.040	.040	.20/.35	.40/.60	.40/.60	.30/.40		.90	18.00	1.40	28.00
NE 8949	.45/.52	1.00/1.30	.040	.040	.20/.35	.40/.60	.40/.60	.30/.40		1.20	24.00	1.70	34.00

Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and \$54. per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished.

nestle  
xima.

coal

31.34

23.50

Steel  
ndry,

elling

within

50c.  
ent),  
for

ceed

e  
0

lets,  
oms,  
Slabs

9.00

7.00

3.00  
3.00

5.00  
3.00  
3.00

3.00

5.00

5.00

3.00

3.00

3.00

1.00

per  
hed.



## Eye protection increases welding efficiency . . . .

Information supplied by "The Iron Age"

Adequate protection for the eyes of welders is one of the most practical ways of increasing their efficiency. Production figures show that proper care in selecting welding lenses can increase output by 15 per cent.

Radiations from intensely heated solids or vapors are of three types: ultra-violet, visible and infra-red. The prime consideration in selecting protective lenses is the elimination of the harmful rays at either end of the spectrum. Lenses which meet Federal Specification Section GGH-211, Section IV, are now manufactured and stocked by a number of companies. Differ-

ent shades are indicated for various operations such as gas cutting, gas welding and arc welding.

Beyond this however, it remains for the operator to select the shade or density of color that is best suited to his particular sight and work. Acuity of vision varies considerably in individuals, so that a man with very good eyesight may get a clear definition of his work with a lens that would be too dark for another man whose sight is not so keen. The optimum is one that shows a clear definition of the work without any eyestrain.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

**Climax Molybdenum Company**  
**500 Fifth Avenue • New York City**



## PRICES

### BOILER TUBES

Seamless Steel and Lap Weld Commercial  
Boiler Tubes and Locomotive Tubes  
Minimum Wall  
(Net base prices per 100 ft., f.o.b. Pitts-  
burgh, in carload lots)

		Seamless Cold	Hot	Lap Weld, Hot
		Drawn	Rolled	Rolled
2	in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½	in. o.d. 12 B.W.G.	20.21	17.54	16.58
3	in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½	in. o.d. 11 B.W.G.	23.37	24.62	23.15
4	in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)  
40,000 lb. or ft. over.....Base  
30,000 lb. or ft. to 39,999 lb. or ft. 5%  
20,000 lb. or ft. to 29,999 lb. or ft. 10%  
10,000 lb. or ft. to 19,999 lb. or ft. 20%  
5,000 lb. or ft. to 9,999 lb. or ft. 30%  
2,000 lb. or ft. to 4,999 lb. or ft. 45%  
Under 2,000 lb. or ft. .... 65%

### CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago.....	\$54.80
6-in. and larger, del'd New York.....	52.20
6-in. and larger, Birmingham.....	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles.....	69.40
6-in. and larger f.o.b. cars, Seattle.....	71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle.

### RAILS, TRACK SUPPLIES

	(F.o.b. Mill)
Standard rails, heavier than 60 lb., gross ton.....	\$40.00
Angle bars, 100 lb. ....	2.70
(F.o.b. Basing Points) Per Gross Ton	
Light rails (from billets).....	\$40.00
Light rails (from rail steel).....	39.00
	Base per Lb.
Cut spikes.....	3.00c.
Screw spikes.....	5.15c.
Tie plates, steel.....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts.....	4.75c.
Track bolts, heat treated, to rail-roads.....	5.00c.
Track bolts, jobbers discount.....	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond

### Lake Superior Ores (51.50% Fe.) (Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer, 51.50.....	\$4.75
Old range, non-bessemer, 51.50.....	4.60
Mesaba, bessemer, 51.50.....	4.60
Mesaba, non-bessemer, 51.50.....	4.45
High phosphorus, 51.50.....	4.35

### Foreign Ores\*

	(C.i.f. Philadelphia or Baltimore, Exclusive of Duty)	Per Unit
African, 46-48 Mn.....	70c.-75c.	
Indian, 48-50 Mn.....	75c.	

### Furnace

	Per Net Ton
†Connellsville, prompt.....	\$6.00

### Foundry

†Connellsville, prompt....\$6.75 to \$7.00  
\*Maximum by-product coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the selling prices was published in THE IRON AGE, Sept. 25, p. 94B. Maximum beehive

### FERROALLOYS

#### Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads).....\$135.00

#### Spiegeleisen

Per Gross Ton Furnace  
Domestic, 19 to 21%.....\$36.00  
Domestic, 26 to 28%.....49.50

#### Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)  
50% (carload lots, bulk).....\$74.50  
50% (ton lots, packed).....87.00  
75% (carload lots, bulk).....135.00  
75% (ton lots, packed).....151.00

#### Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 S4)  
F.o.b. Jackson, Ohio.....\$29.50\*  
Buffalo.....30.75\*  
For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.  
\*Official OPA price established June 24, 1941.

#### Bessemer Ferrosilicon

Prices are \$1 a ton above Silvery Iron quotations of comparable analysis.

#### Ferrochrome

(Per Lb., Contained Cr, Delivered Car-  
lots, Lump Size, on Contract)  
4 to 6 carbon.....13.00c.  
2 carbon.....19.50c.  
1 carbon.....20.50c.  
0.10 carbon.....22.50c.  
0.06 carbon.....23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

### FLUORSPAR

#### Fire Clay Brick

Per Net Ton  
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....\$25.00  
Domestic, f.o.b. Ohio River landing barges.....25 00  
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines.....25.00  
Foreign, 85% calcium fluoride, not over 5% Cl, c.i.f. Atlantic ports, duty paid.....Nominal  
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.....\$34.00  
As above, in bags, f.o.b. same mines.....36.40

### ORES

Brazilian, 46-48 Mn.....81c. to 83c.  
Cuban, 51 Mn.....85c.

Per Short Ton Unit  
Tungsten, Chinese, Wolframite, duty paid, delivered.....\$24 to \$26  
Tungsten, domestic scheelite, at mine.....\$24 to \$25  
Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton; South African (low grade).....\$28 to \$30  
Rhodesian, 45.....Nom.  
Rhodesian, 48.....Nom.

\*Importations no longer readily available. Prices shown are nominal.

### COKE\*

furnace coke prices established by OPA, Jan. 26. †F.O.B. oven.

By-product, Chicago.....	\$12.25
By-product, New England.....	\$13.75
By-product, Newark.....	\$12.40 to \$12.95
By-product, Philadelphia.....	\$12.38
By-product, Cleveland.....	\$12.30
By-product, Cincinnati.....	\$11.75
By-product, Birmingham.....	\$8.50†
By-product, St. Louis.....	\$12.02
By-product, Buffalo.....	\$12.50

#### Silico-Manganese

(Per Gross Ton, Delivered, Lump Size, Bulk, on Contract)

3 carbon.....	\$113.00*
2.50 carbon.....	118.00*
2 carbon.....	123.00*
1 carbon.....	133.00*

#### Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload.....\$2.00  
Ferrotungsten, 100 lb. and less... 2.25  
Ferrovanadium, contract, per lb. contained V, del'd.....\$2.70 to \$2.90†  
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots.....\$2.25†  
Ferrocobaltitanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload contract, net ton.....\$142.50  
Ferrocobaltitanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload contract, net ton.....\$157.50  
Ferrophosphorus, electric or blast furnace materials, carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage freight, equalized with Rockdale, Tenn., gross ton.....\$58.50  
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage, freight equalized with Nashville, gross ton.....\$75.00  
Ferromolybdenum, per lb., Mo, f.o.b. furnace.....95c.  
Calcium molybdate, per lb. Mo., f.o.b. furnace.....80c.  
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.....80c.  
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa.....80c.

\*Spot prices are \$5 per ton higher.  
†Spot prices are 10c. per lb. of contained element higher.

### REFRACTORIES

(F.o.b. Works)

#### Fire Clay Brick

Per 1000  
Super-duty brick, St. Louis.....\$64.60  
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....51.30  
First quality, New Jersey.....56.00  
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....46.55  
Second quality, New Jersey.....51.00  
No. 1, Ohio.....43.00  
Ground fire clay, net ton.....7.60

#### Silica Brick

Pennsylvania.....\$51.30  
Chicago District.....58.90  
Birmingham.....51.30  
Silica cement, net ton (Eastern)... 9.00

#### Chrome Brick

Per Net Ton  
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester.....\$54.00  
Chemically bonded, f.o.b. Baltimore, Plymouth Meeting and Chester Pa.....54.00

#### Magnesite Brick

Standard f.o.b. Baltimore and Chester.....\$76.00  
Chemically bonded, f.o.b. Baltimore 65.00

#### Grain Magnesite

Domestic, f.o.b. Baltimore and Chester in sacks (carloads).....\$44.00  
Domestic, f.o.b. Chewelah, Wash. (in bulk).....22.00

### FUEL OIL

No. 6 Bur. Std., del'd Chicago....4.75c.  
No. 3 distillate del'd Cleveland....6.50c.  
No. 4 indus., del'd Cleveland.....6.00c.  
No. 5 indus., del'd Cleveland.....5.25c.  
No. 6 indus., del'd Cleveland.....5.25c.



# Your Scrap is Needed to Finish 'Em Off

Victory will do more than save our old world; it will bring a new and better world. Old products, old processes, much of our old equipment will be obsolete. Progress will put some of our old equipment on the junk heap. Why wait? Write it off, move it out, send it to the furnaces to be transformed by fire into weapons for fighters. Millions of tons of scrap have

been supplied by farmers and individuals. The main source of this vital commodity is now shifting to manufacturers, metal workers and service shops. Remember that 50% of every charge for an open hearth or electric furnace is SCRAP. Every pound of scrap you can spare means two pounds of steel for bombs or planes or tanks.

**CONTINENTAL STEEL CORPORATION, Kokomo, Indiana**

(The Superior Sheet Steel Co., Canton, Ohio — A Subsidiary)



# CONTINENTAL

## STEEL CORPORATION

**SHEETS:** Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terae, etc.

**WIRE:** Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.



# PRICES

## ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

## WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cutnails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	\$3.05
Annealed galvanized fence wire	3.40

	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

\*15½ gage and heavier. †On 80-rod spools in carload quantities.

## ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per

Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

## BOLTS, NUTS, RIVETS, SET SCREWS

### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and Carriage Bolts:	
½ in. & smaller x 6 in. & shorter	65½
9/16 & 5/8 in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1½ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	63

### Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)	
½ in. and smaller	62
9/16 to 1 in. inclusive	59
1½ to 1½ in. inclusive	57
1½ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

### Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

7/16 in. and smaller	64
½ in. and smaller	62
½ in. through 1 in.	60
9/16 to 1 in.	59
1½ in. through 1½ in.	57
1½ in. and larger	56

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	
71 and 10	
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

### Large Rivets (½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.75

### Small Rivets (7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

### Cap and Set Screws Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	
64	
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Flister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

## PIPE AND TUBING

### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills (F.o.b. Pittsburgh only on wrought pipe) Base Price—\$200 per Net Ton

### Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

### Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1½ in.	34	16
1½ in.	38	18½
2 in.	37½	18

### Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

### Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

### Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

### Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

### Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

### Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

## WAREHOUSE PRICES (Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

CITIES	SHEETS			STRIP		Plates (¼ in. and heavier)	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	Cold Drawn 3100
Pittsburgh	\$3.35		\$4.65	\$3.60	\$3.20	\$3.40	\$3.40	\$3.35	\$3.65	\$7.45	\$5.75	\$8.40	\$6.75
Chicago	3.25	4.10	4.85	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland	3.35	4.05	4.82	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia	3.55	4.05	4.85	3.51	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.56	7.16
New York	3.58	4.60	5.00	3.96	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.19
Detroit	3.43	4.30	4.84	3.68	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo	3.25	4.30	4.75	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston	3.71	4.68	5.11	4.06	3.46	3.85	3.85	3.98	4.13	7.75	6.05	8.88	7.23
Birmingham	3.45	4.75	4.75	3.70	3.53	3.55	3.55	3.50	4.48				
St. Louis	3.39	4.24	4.99	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee	3.38	4.23	4.98	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Baltimore	3.50		5.05	4.00		3.70	3.70	3.85	4.04				
Cincinnati	3.42	4.37	4.42	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk	3.85		5.40	4.10		4.05	4.05	4.00	4.15				
Washington	3.60			4.10		3.80	3.80	3.95	4.10				
Indianapolis	3.45	4.25	5.01	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha	3.85		5.52	4.20		4.15	4.15	4.10	4.42				
Memphis	3.85		5.25	4.10		3.95	3.95	3.90	4.31				
New Orleans	4.05			4.30		3.90	3.90	4.10	4.60				
Houston	4.00			4.30		4.05	4.05	3.75					
Los Angeles	4.95	7.15	5.95	4.90		4.90	4.60	4.35	6.60	9.55	8.55	10.55	9.55
San Francisco	4.55	7.05	6.10	4.50		4.65	4.35	3.95	6.80	9.80	8.80	10.80	9.80
Seattle	4.65		5.70	4.25		4.75	4.45	4.20	5.75		9.00		

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: 1500 to 1499 lb. 400 to 1499 lb. 400 to 3999 lb. 450 to 1499 lb. 1000 to 1999 lb. 0 to 1999 lb. 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations. \*12 gage and heavier, \$3.43. †Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.